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Rock Products

and CEMENT and ENGINEERING NEWS (Est. 1896)

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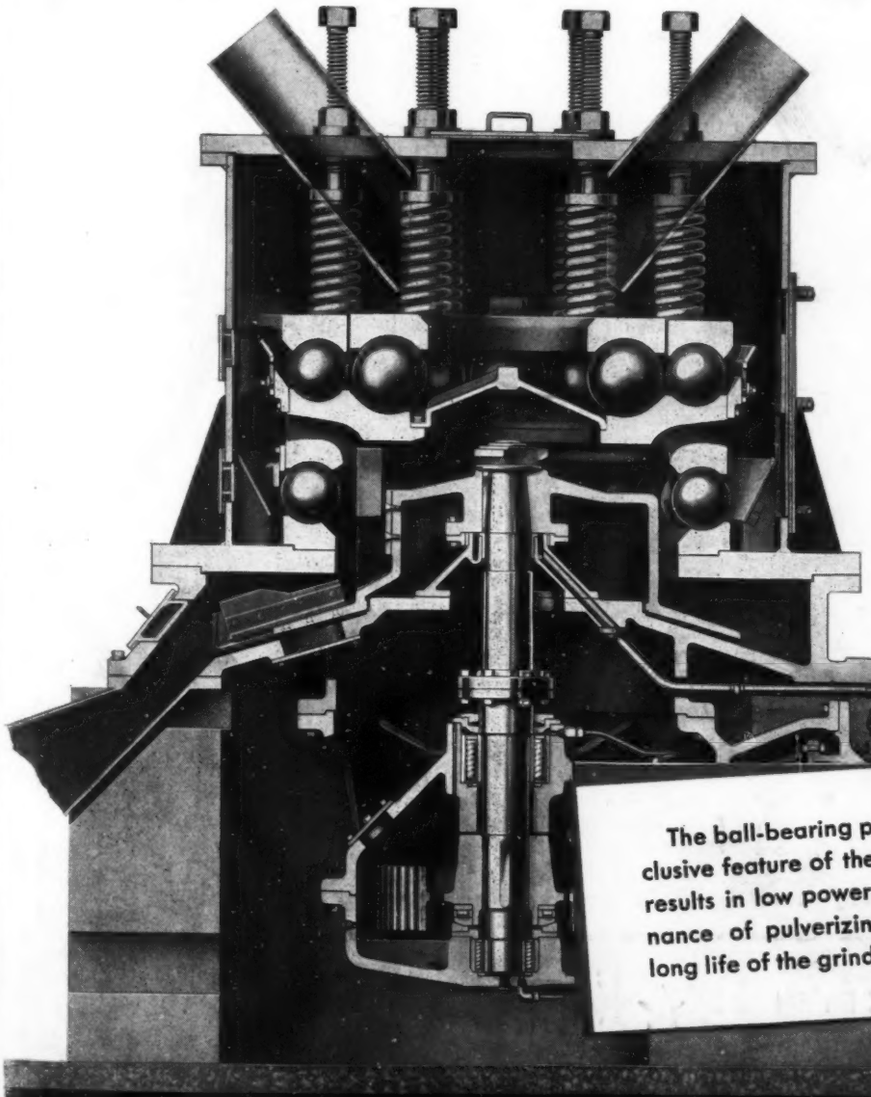
B&W TYPE B PULVERIZERS



for Preliminary or Finish Grinding

As a preliminary mill: By giving tube mills a feed of 60 to 70 per cent through 200 mesh, tube mill capacities have been increased as much as 72 per cent.

As a finishing mill: Delivers, in a single operation, cement as high as 3100 sq. cm. per gram.

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Macwhyte wire lines are used on all types of drilling equipment. Macwhyte also manufactures specially designed PREformed and non-preformed wire ropes for shovels, cranes, draglines, cableway excavators, scrapers, loaders, mixers, pavers and incline hoists.

specially designed for BLAST HOLE DRILLING!

Far greater reach—greater elastic stretch—than standard 6 x 19 lines

• Records show this specially designed wire line for blast hole drilling speeds drilling time—cuts drilling costs!

Macwhyte Hi-Lastic has far greater reach, far more resiliency than any standard line. Tools drop farther for a given stroke on the machine—striking a hard, fast blow. In most cases, the entire hole can be drilled without a manila cracker.

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Write Dept. RP-11 for complete specifications, prices and name of nearest distributor.

MACWHYTE COMPANY
KENOSHA, WISCONSIN

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MACWHYTE ★ HI-LASTIC WIRE LINES

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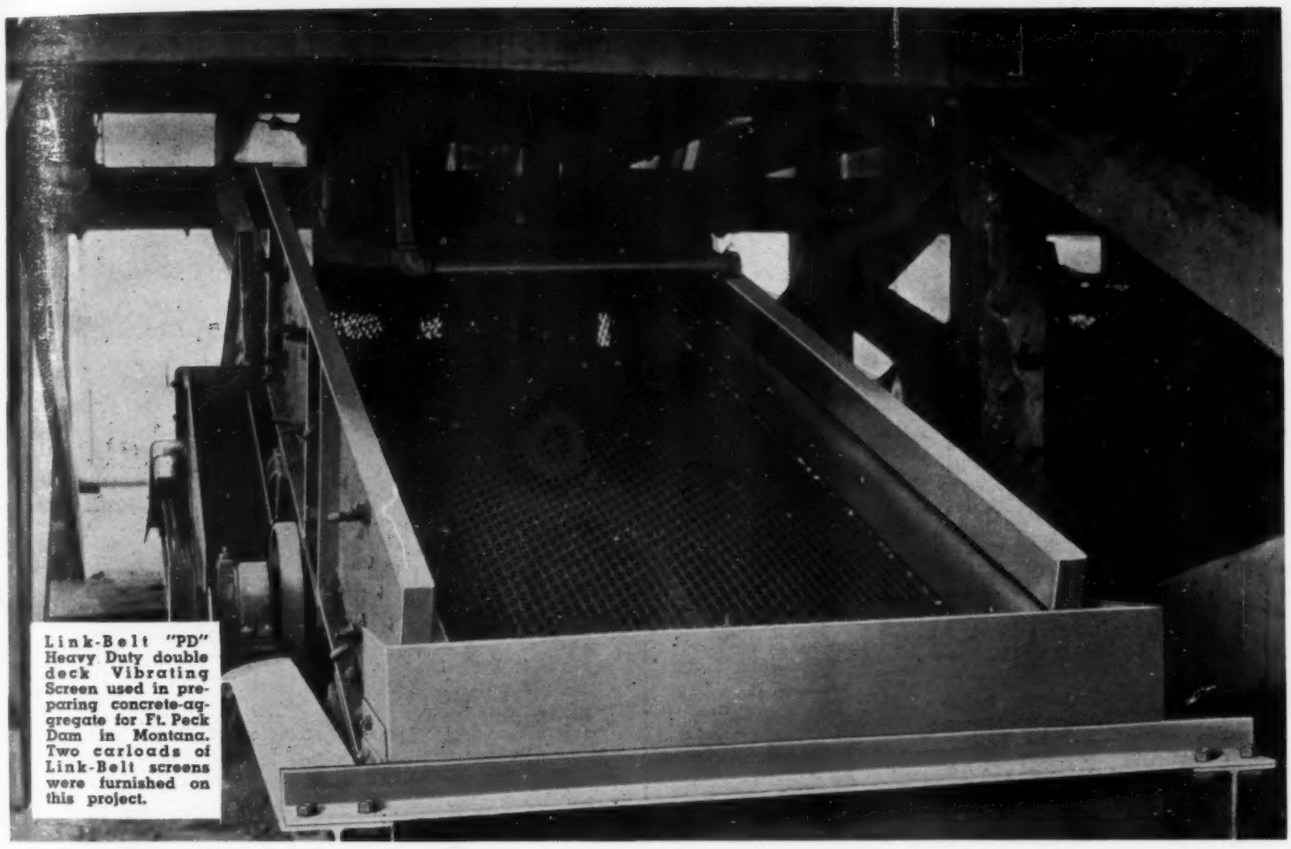

Link-Belt "PD" Heavy Duty double deck Vibrating Screen used in preparing concrete-aggregate for Ft. Peck Dam in Montana. Two carloads of Link-Belt screens were furnished on this project.

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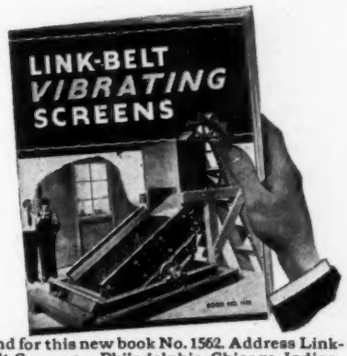

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All the skill in compounding, testing, manufacturing rubber products—gained in these special applications—is available *and used* to make Highflex Transmission Belting, Longlife Conveyor Belting, Type 50 Air Hose and every other Goodrich product a *better value.* The B. F. Goodrich Company, Mechanical Rubber Goods Division, Akron, Ohio.

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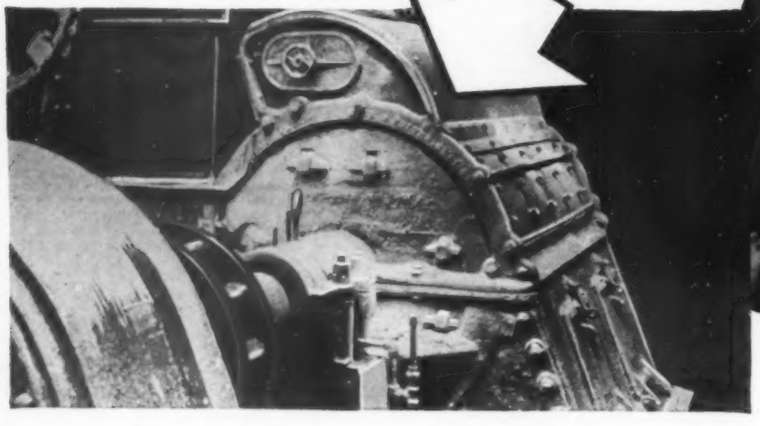

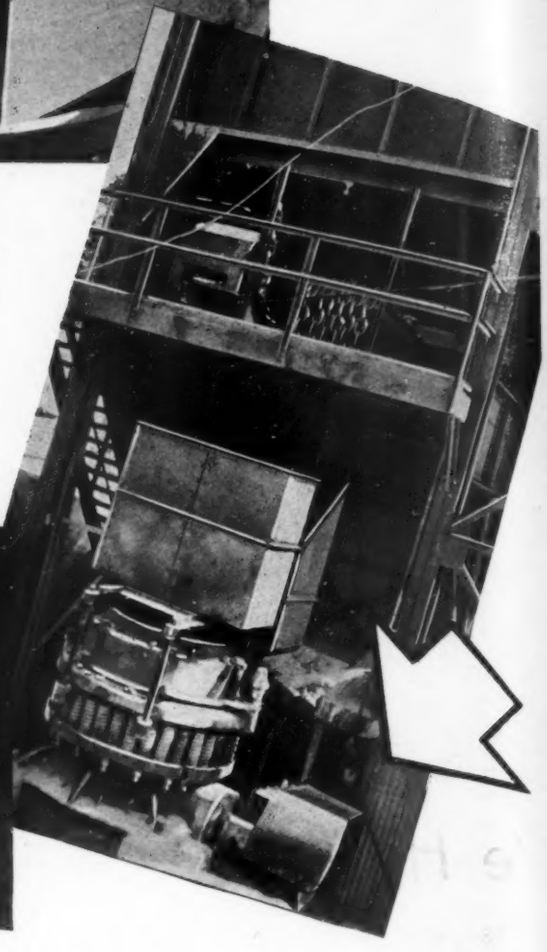

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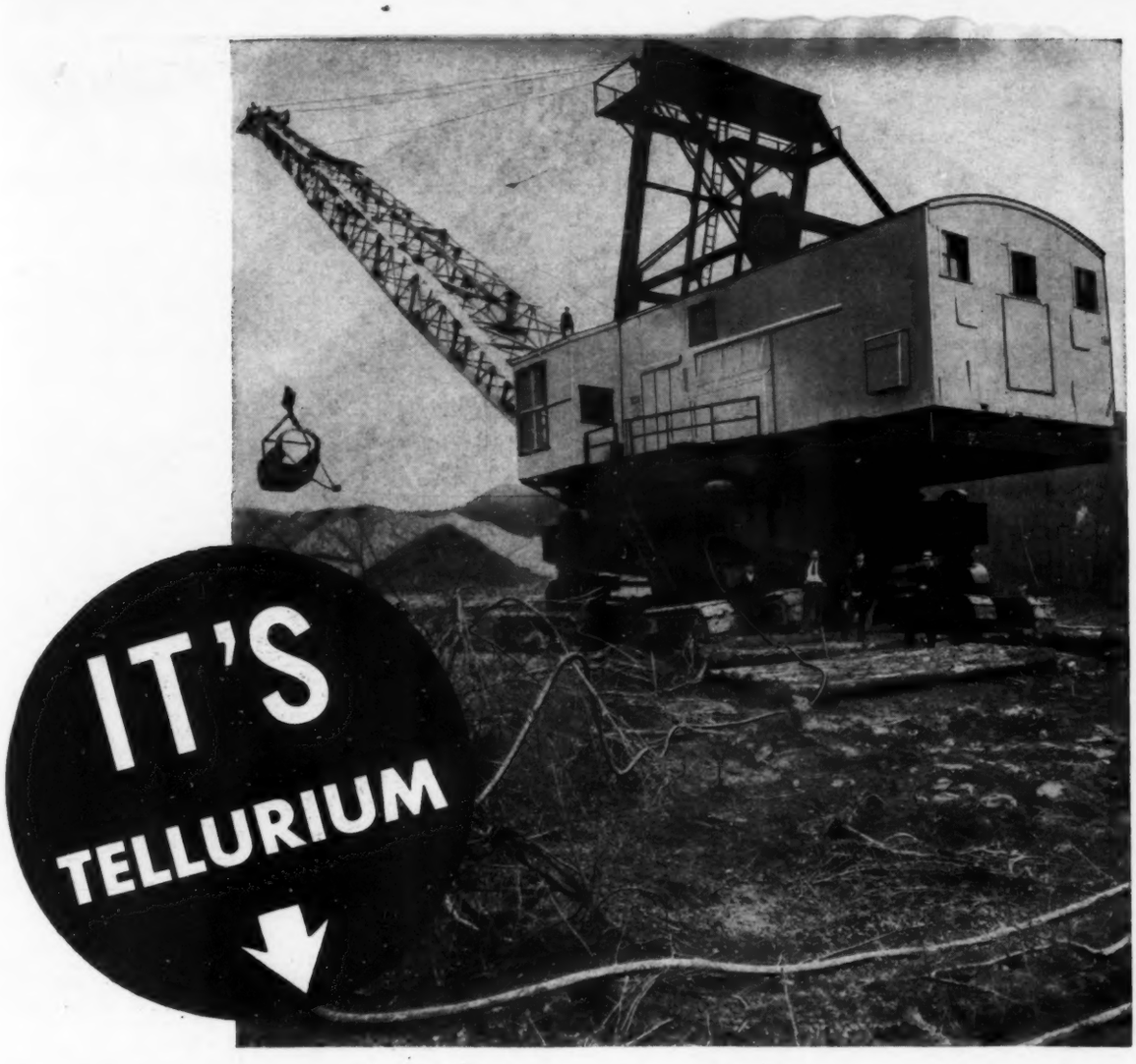

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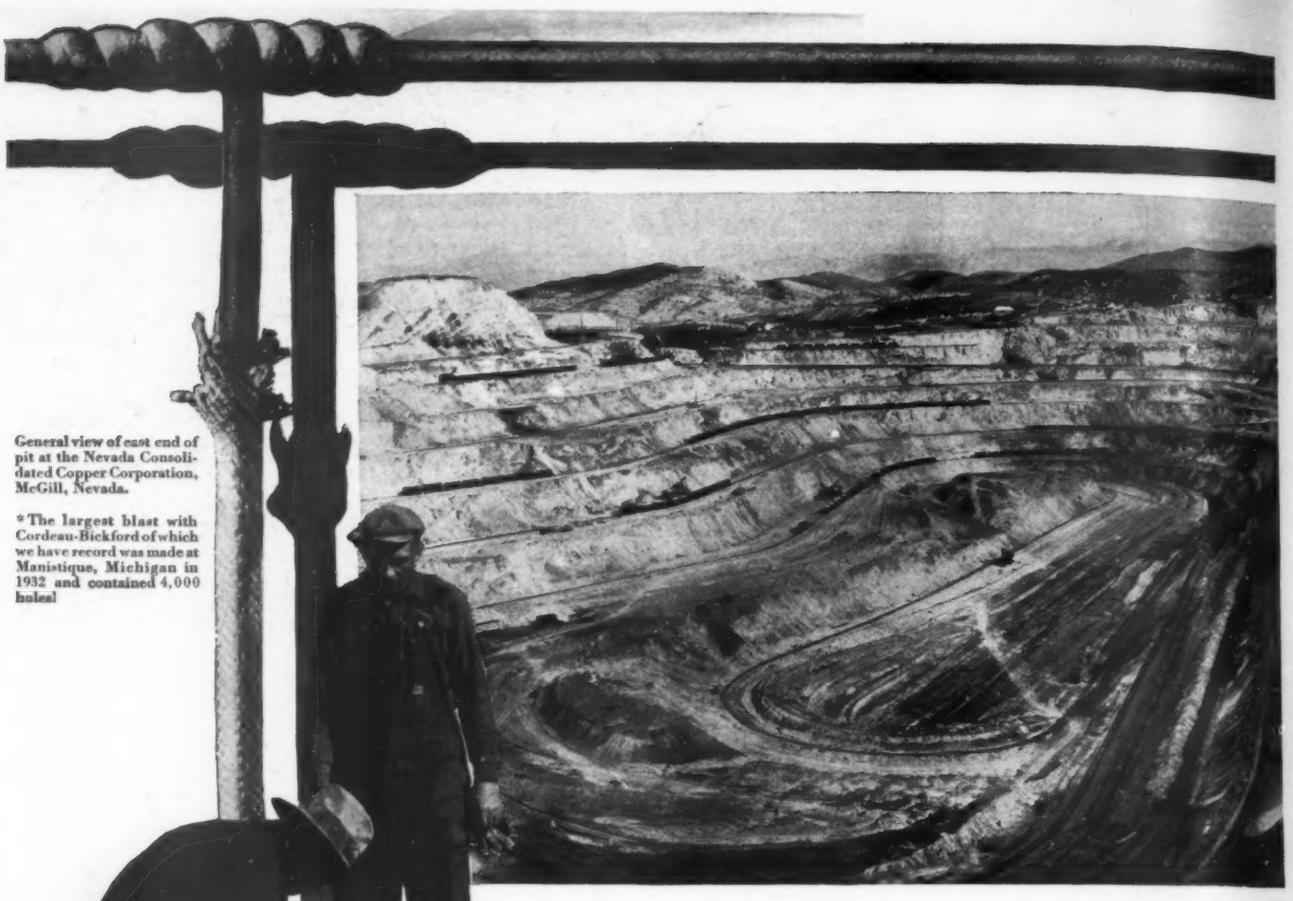

General view of east end of pit at the Nevada Consolidated Copper Corporation, McGill, Nevada.

*The largest blast with Cordeau-Bickford of which we have record was made at Manistique, Michigan in 1932 and contained 4,000 holes!

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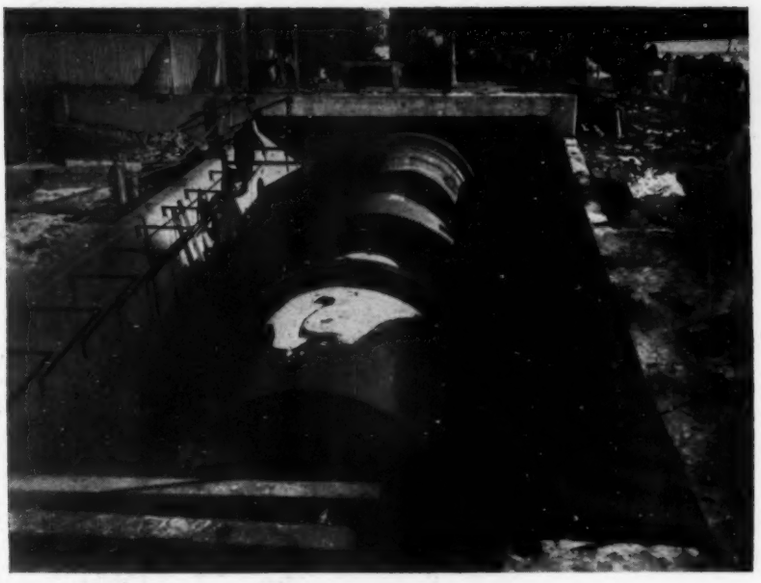

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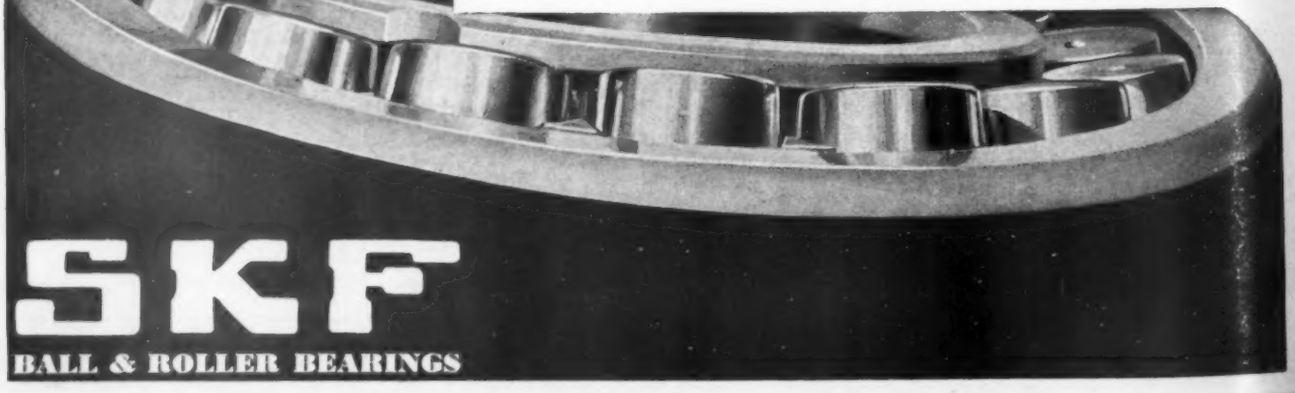

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UNAX GRATE COOLER
FOR ROTARY KILNS
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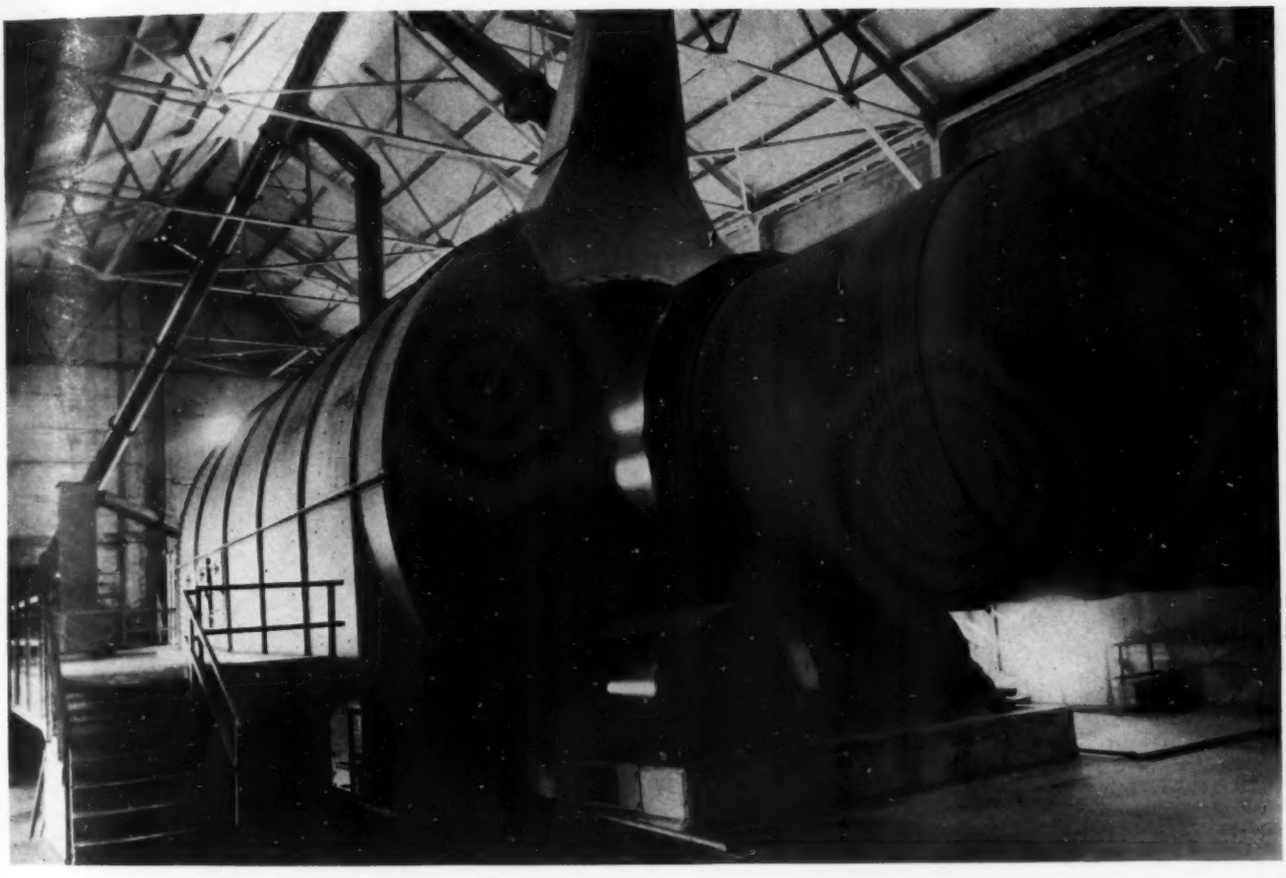

THE UNAX GRATE COOLER consists of two parts: one stationary, one revolving. The stationary part comprises a casing surrounding the outlet end of the kiln and containing a stationary grate. The revolving part consists mainly of conveying flights and scoops attached to and rotating with the kiln, spreading the clinker evenly over the grate, through which cooling air is passed. The heated air is used for combustion in the kiln.

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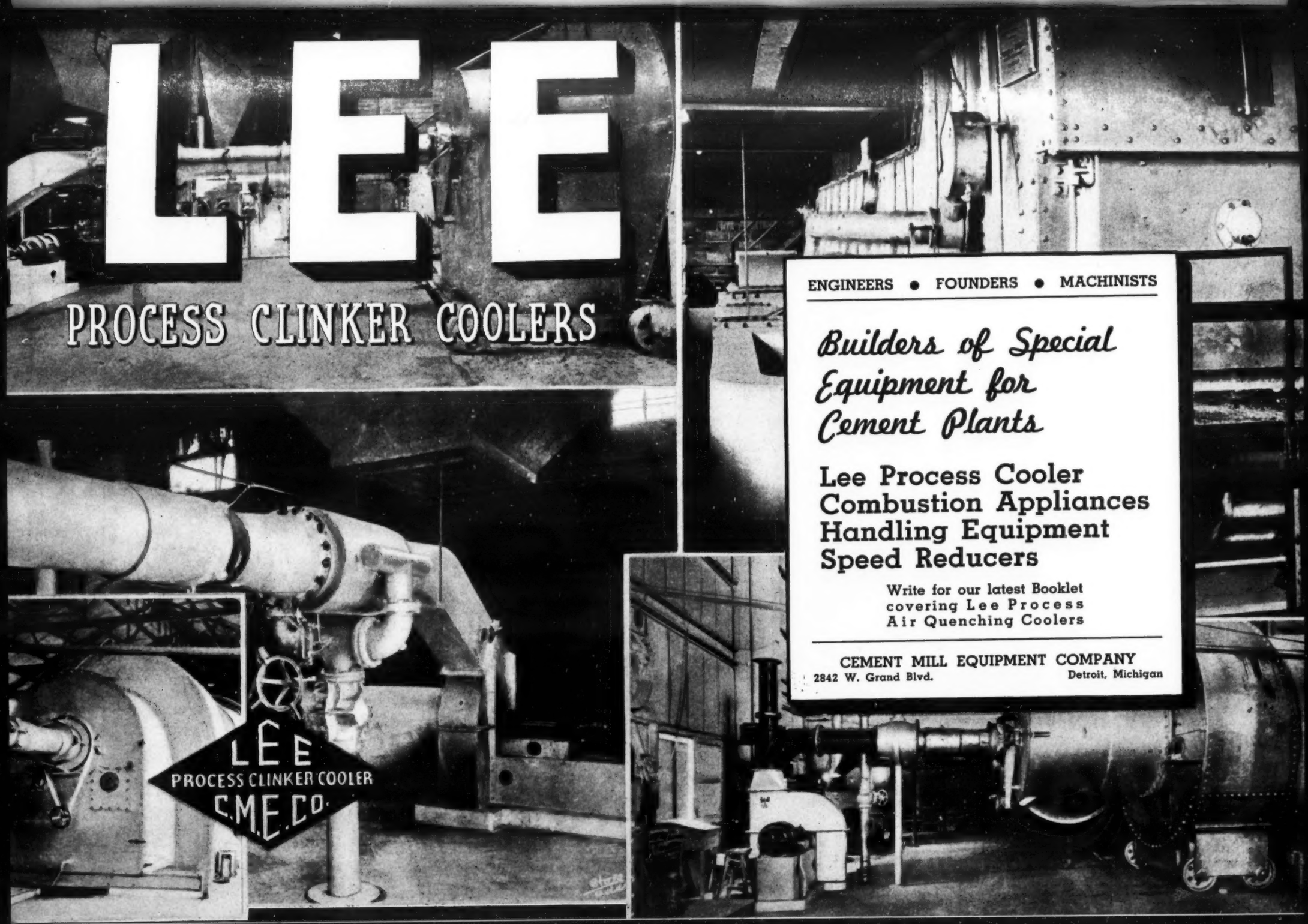
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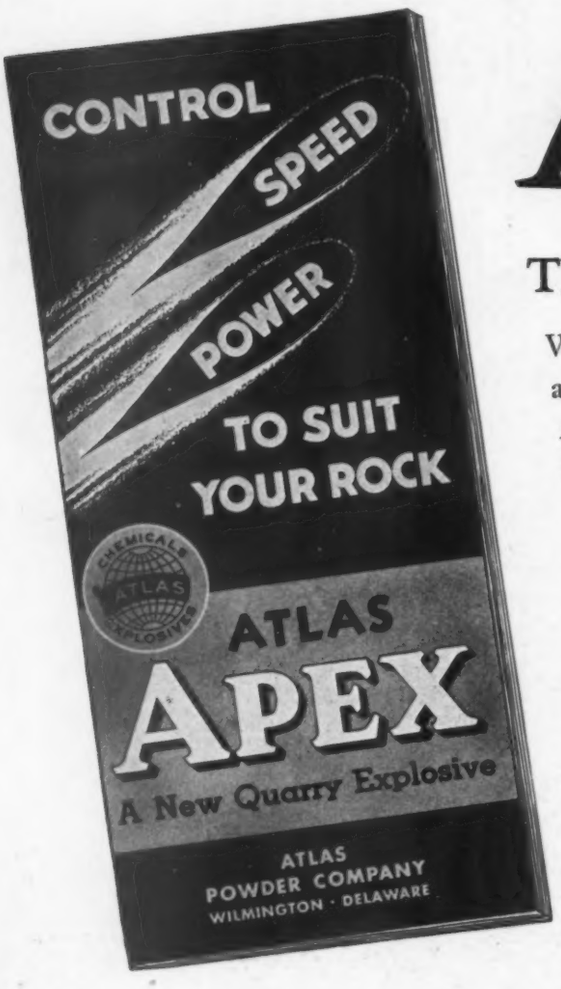

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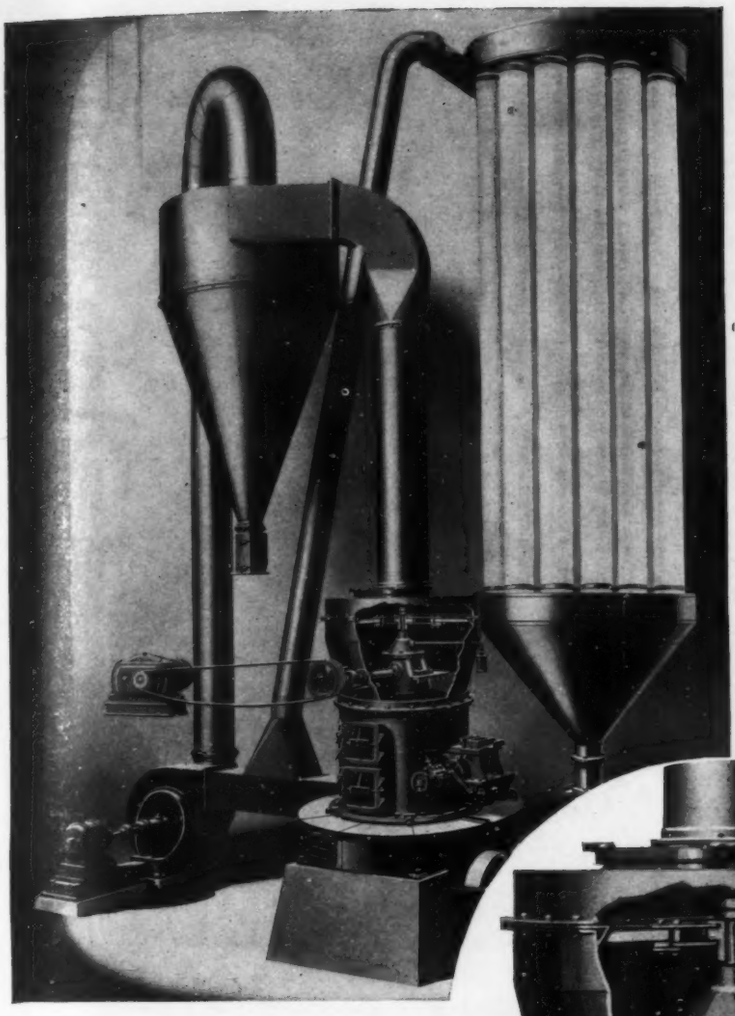

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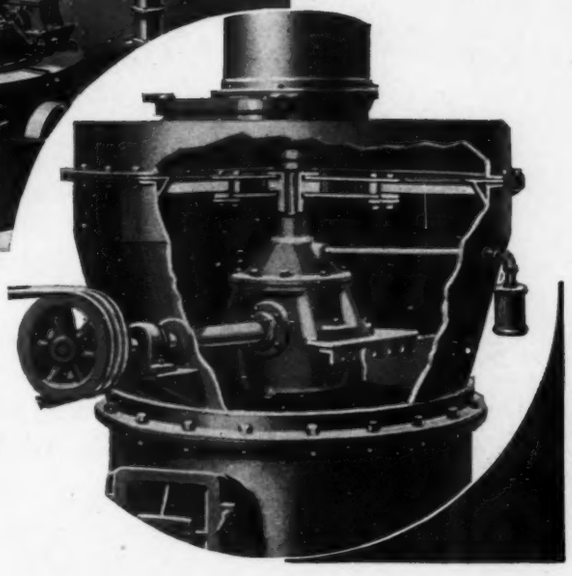

Cut-away view showing how the revolving whizzer is mounted in the separating chamber above the mill. A variable speed control gives instant and infinite regulation of the fineness.

SUPER-FINE SULPHUR

An installation of a Raymond Roller Mill with whizzer separator is successfully grinding sulphur to a fineness of 99% passing 325-mesh. It is operating on a 24-hour basis, and it delivers an average of 5800 lbs. per hour. These results are way beyond anything previously obtained, definitely demonstrating the superiority of the whizzer-type mill for extremely fine production, and for record low costs.

CHALK WHITING

A custom grinding plant formerly was able to get only 1500 to 2000 pounds per hour in pulverizing chalk materials with the original equipment. After installing a Raymond whizzer separator in the roller mill, there is no difficulty in obtaining 4000 pounds per hour of finished product at 99.7% passing 325-mesh. Doubling output is typical performance for the whizzer-equipped Raymond Roller Mill.

THE Raymond Whizzer Type Roller Mill ranks as one of the most important developments in modern pulverizing machinery. The revolving whizzer—with variable speed control—gives any desired fineness from medium fine to micron material, simply by a change of speed. If you are grinding limestone, pigments, clay or oxides, you should look into the advantages of this new mill.

RAYMOND BROS. IMPACT PULVERIZER CO.

DIVISION OF COMBUSTION ENGINEERING CO., INC.

Main Office and Works: 1307 North Branch Street, Chicago

Sales Offices in all Principal Cities ■ Canadian Repr.: Combustion Engineering Corp., Ltd., Montreal

NO NORTHWEST Welded SHOVEL BOOM HAS EVER FAILED!

THE HUSKIEST FRONT END ON ANY SHOVEL— SIZE FOR SIZE

NORTHWEST ENGINEERING CO.

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GASOLINE • ELECTRIC • DIESEL • OIL

Built in a range of 15 SIZES 3/8 yd. capacity and Larger

NORTHWEST

This new unit represents the only advance in air separator practice since the introduction of the original GAYCO centrifugal more than ten years ago.

The principle of rejecting the coarse particles by means of a centrifugal sizing fan is an exclusive GAYCO patent.

Improved design embodies many desirable features resulting in higher efficiency and added economies in the classification of Non-Metallic Materials: Cement, Gypsum, Silica, Limestone, Feldspar, Kaolin, Slate Dust and Slate Granules.

Added advantages are: Economical operation — Lowest maintenance cost — absolute uniformity of product.

The New Gayco covers the entire range of fine separation without any change in pulley speed and will separate practically all dry fine materials including many that are too sticky to be screened.

The New Gayco Centrifugal Air Separator is available in seven sizes up to 16 feet diameter, including a 30-inch size for laboratory use and pilot plants.

Write for complete details. Let our engineers give you the benefit of many years of experience without obligation.

Universal Road Machinery Co.

MAIN OFFICE AND FACTORY KINGSTON, N. Y.

LABORATORY KINGSTON, N. Y.

GAYCO

RUBERT M. GAY - DIVISION

114 LIBERTY STREET

NEW YORK, N. Y., U. S. A.

GAYCO

"GAYCO" CENTRIFUGAL SEPARATORS

"RELIANCE" CRUSHING, SCREENING AND WASHING EQUIPMENT

This GRAVEL PLANT . . . . .

is a 1936 MODEL

● In 1936, while most aggregate markets were over-produced, the Pioneer Fuel & Brick Co. of Butte, Montana, built a new gravel plant at Finlen, Mont. This completely modern plant was designed by Telsmith engineers to meet today's conditions. Each piece of Telsmith-built machinery is properly co-ordinated and balanced. The plant runs smoothly, efficiently *and profitably.*

Excavated material is delivered into the plant receiving hopper, equipped with a 16″x 5′ Telsmith Plate Feeder, and evenly discharged to an 18″x 66′ conveyor which takes it up to a 3 x 6′ Telsmith Double Deck Pulsator, used as a scalping screen. The screen's upper deck rejects the larger boulders to a Telsmith 8-B Primary Breaker; second deck rejects intermediate size to a Telsmith No. 32-B Reduction Crusher. All crushed material is returned to scalping screen for re-sizing before going to washing plant. Undersize passing the screen's lower deck goes to an 18″x 123′ Telsmith Belt Conveyor which discharges to a wash box. Water is added and raw material flumed to a 40″x 14′ Telsmith Ajax Rotary Washing Screen with blank and perforated washing sections, sand jacket, and gravel screening sections. Sand and water pass through the sand jacket and into a No. 5 Telsmith Sand Tank which separates coarse sand; overflow to a Telsmith No. 6 Sand Tank where fine sand is deposited. Each size of sand is discharged to a separate bin. Gravel is scrubbed, rinsed, sized and chuted to two separate bins. All storage bins are equipped with Telsmith Bin Gates.

Whether you are modernizing or planning a new gravel plant, write for Bulletin G-11 describing Telsmith engineering and equipment service.

SMITH ENGINEERING WORKS, 508 E. CAPITOL DRIVE, MILWAUKEE, WISCONSIN

Associates in Canada: Canadian Ingersoll-Rand Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver

50 Church St. New York City
201 N. Wells Chicago, Ill.
1013 Commercial Trust Bldg. Philadelphia, Pa.
81 Binney St. Boston, Mass.
412 Westinghouse Bldg. Pittsburgh, Pa.
Abrams-Anderson Co. Detroit, Mich.
Brandeis M. & S. Co. Louisville, Ky.
L. V. Fraley & Son St. Louis, Mo.

G-2

TELSMITH

"All our compressors are eminently Satisfactory"

Our air compressors are located in the departments where air is required and we find that this arrangement has worked out in a very satisfactory manner. At present we have the following equipment of Fuller Rotary Compressors.

Quarry: One Two-Stage, Class C 50-16 Cap. 232 CFM
Cement Silos & Packing House: Four Single-Stage, Class C 120, Cap. 500 CFM
Slurry Agitation & Cement Transport: One Two-Stage, Class C 150-80, Cap. 750 CFM.

This distribution we have found to be advantageous. We all know that compressed air is an expensive commodity. As soon as the various departments have completed their daily cycle of operations, the compressors are shut down. This means a saving in power, supervision, maintenance, lubrication, and eliminates losses of transmission.

Our units operate every day for periods of from 8 hours to 24 hours, depending on the department they serve. In respect to maintenance cost, reliability in operation, and economy of lubrication, all our compressors are eminently satisfactory.

Kindest regards, we are,

THERE isn't very much we can add to the above letter, written by one cement plant operator to another, making inquiry regarding his experience with Fuller Rotary Compressors.

The statements made merely confirm many others we have received during the past half dozen years . . . one operator tells us he has not made any repairs or replacements in five and one-half years, merely making inspections and cleaning about once a year. Due to simplicity of design this cleaning can be done in comparatively little time and at minimum expense.

It will pay you to investigate the merits of Fuller Rotary Compressors and Vacuum Pumps. Write for Bulletin C3-A.

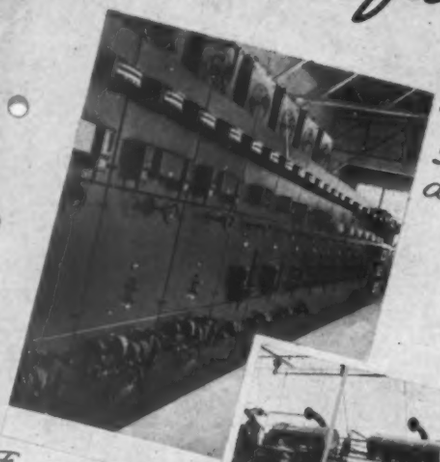
FULLER COMPANY
CATASAUQUA, PENNSYLVANIA

Chicago: 1118 Marquette Bldg.
San Francisco: 320-321 Chancery Bldg.

C-14

FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS · · · · ROTARY FEEDERS AND DISCHARGE GATES
ROTARY AIR COMPRESSORS AND VACUUM PUMPS · · · AUTOMATIC BATCH WEIGHERS · · · BIN SIGNALS

Notes Made on factory trip to Keystone



Main switchboard at Keystone

One of four Type KT 5422, 25-hp, 575-rpm, 440-v G-E induction motors driving exhauster fans for air-sweeping cement mills

Four Type H, 2000-kva, 33,000/2300-440-v G-E transformers

Three Type MPC, 250-kw, 1200-rpm, 250-v, d-c generators direct connected to Type TS, 375-hp, 1200-rpm, 2300-v G-E synchronous motors

Six of eight Type TSR 50, 700-hp, 144-rpm, 2300-v G-E synchronous motors driving pulverizers

Two Type TS 6304D, 300-hp, 225-rpm, 2200-v G-E synchronous motors driving air compressors

GENERAL

ANOTHER FACTORY TRIP SHOWS THAT

Keystone Portland Cement

Believes *in* "Preparedness" *for Greater Business* —*Using* G-E Equipment

WHEN the Keystone Portland Cement Company, Bath, Pa., enlarged its cement mill, General Electric furnished the complete electric equipment, from substation and distribution apparatus to motor drives for the final processes. Keystone engineers estimated that a power saving of $5,000 per year could be effected by using G-E equipment. Their expectations have been fully realized. The efficiency of the plant has been increased—the kilowatt-hour consumption per barrel of output has been materially lowered.

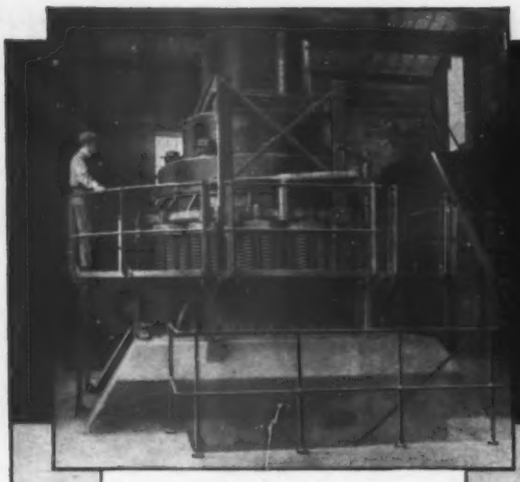
G-E Power Selsyn Perfectly Synchronizes Feeder with Kiln

Sturdy, self-contained G-E Selsyn synchronizing units automatically maintain required rate of feed to the kiln, minimize mud-ring formations, prolong life of kiln lining, and assist in producing high uniformity of clinker

General Electric is ready to supply your plant with electric equipment for shovels, quarry hoists, rock crushers, material conveyors, overhead cranes, coal mills, kiln buildings, slurry agitators, classifiers, and packers, and the new automatic photoelectric kiln temperature control. In addition, we shall be glad to give assistance in planning a carefully coordinated electric power system and installation. Call the nearest G-E office for further information. General Electric Company, Schenectady, New York.

011-126

E L E C T R I C



Seven-foot Standard Cone Crusher crushing limestone.

Four-foot Short Head making a very fine limestone product.

CRUSHING and SCREENING you can depend on SYMONS

WHETHER it is for ordinary reduction crushing or for making the finer products as are in demand today, no piece of crushing equipment is comparable to the Symons Cone. With the two types, Standard and Short Head, any requirement for product or capacity can be met. The Symons Cone is the answer for plants whose reduction crushing equipment is obsolete and no longer capable of profitably producing the sizes required today.

The Symons Screen fills the same need in the field of screening. It sets level and with its different screening action, the problem of accurately sized materials is readily solved. When considering changes in either crushing or screening equipment, see what Nordberg has to offer.

NORDBERG MFG. CO.

MILWAUKEE, WISCONSIN

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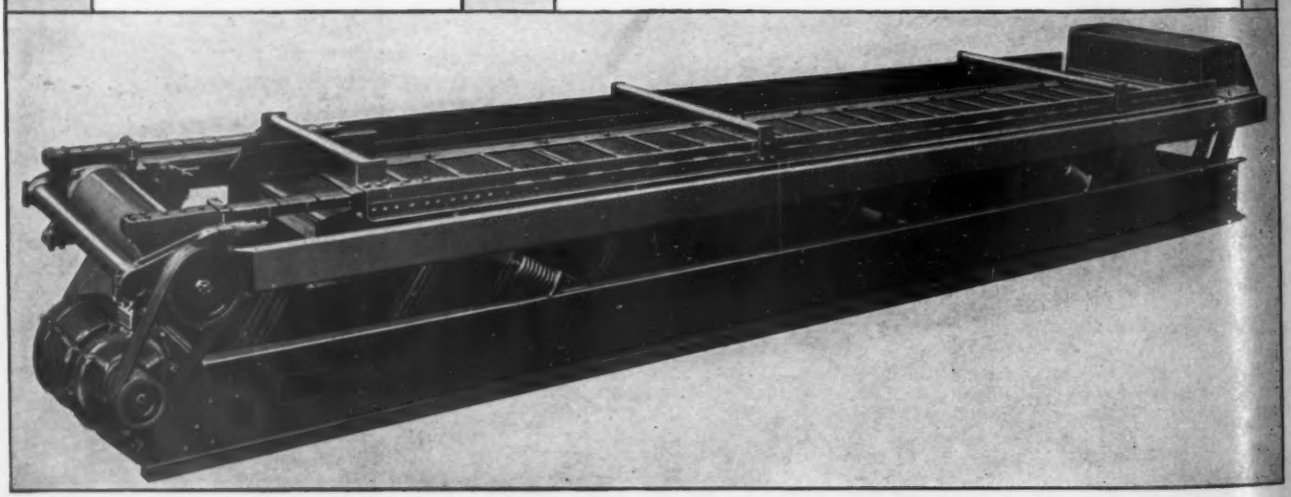

QUESTION — WHY IS SO MUCH HEWITT CONVEYOR BELT *Specified?*

ANSWER . . . Only because the number of industrial buyers who keep complete records of performance is rapidly increasing. That means HEWITT conveyor belt is constantly adding new tonnage records to its score. HEWITT belt is built to "take it", produced under the most rigid standards by the company that makes industrial rubber goods exclusively. Behind the construction of every HEWITT conveyor belt is the direction of men who know your belt problems thoroughly and who draw from a treasure house of craftmanship to give you conveyor belt that stands up year in and year out, even under the most punishing service. Talk it over with one of HEWITT's distributors. They are listed in the classified telephone directories of major industrial centers under "Rubber Goods" or "Belting". And don't fail to find out about the HEWITT Proof Test Plan.

HEWITT

RUBBER CORPORATION
BUFFALO, NEW YORK

HOSE • CONVEYOR AND TRANSMISSION BELTS • PACKING

THE BEST BIT *That Can Be Made*

Our first consideration in the manufacture of Timken Bits is quality.

Our policy is (1) to produce the best bits that can be made, and (2) to sell them at the lowest possible prices consistent with their superior quality.

There are removable bits on the market that can be bought for less than Timken Bits, but the operator who weighs price against performance can easily see the wisdom of paying a few cents more per bit to get the faster drilling, increased footage and longer life of Timken Bits.

Look for the name "TIMKEN" stamped on every removable bit you buy.

Complete Stocks Maintained in Principal Distributing Centers

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN BITS

Announcing H11

THE NEW CLEVELAND SINKER THAT SAVES MONEY ON DRILLING COSTS

• Model H11 is a sturdy, powerful machine in the 55-pound class. For more than a year prior to our announcement, this Cleveland Sinker has been making new records of drilling speed and operating economy under all kinds of working conditions, and in all sections of the U. S. A. Originally designed as a hard-rock drill, it has proven itself a master of soft and medium formations as well. With its fast and powerful hammer blow, strong rotation, effective hole-blowing means, and proven standing-up qualities, the H11 is the sinker for tough drilling jobs. Demonstration whenever and wherever you say. Let us send Bulletin 118, just off the press.

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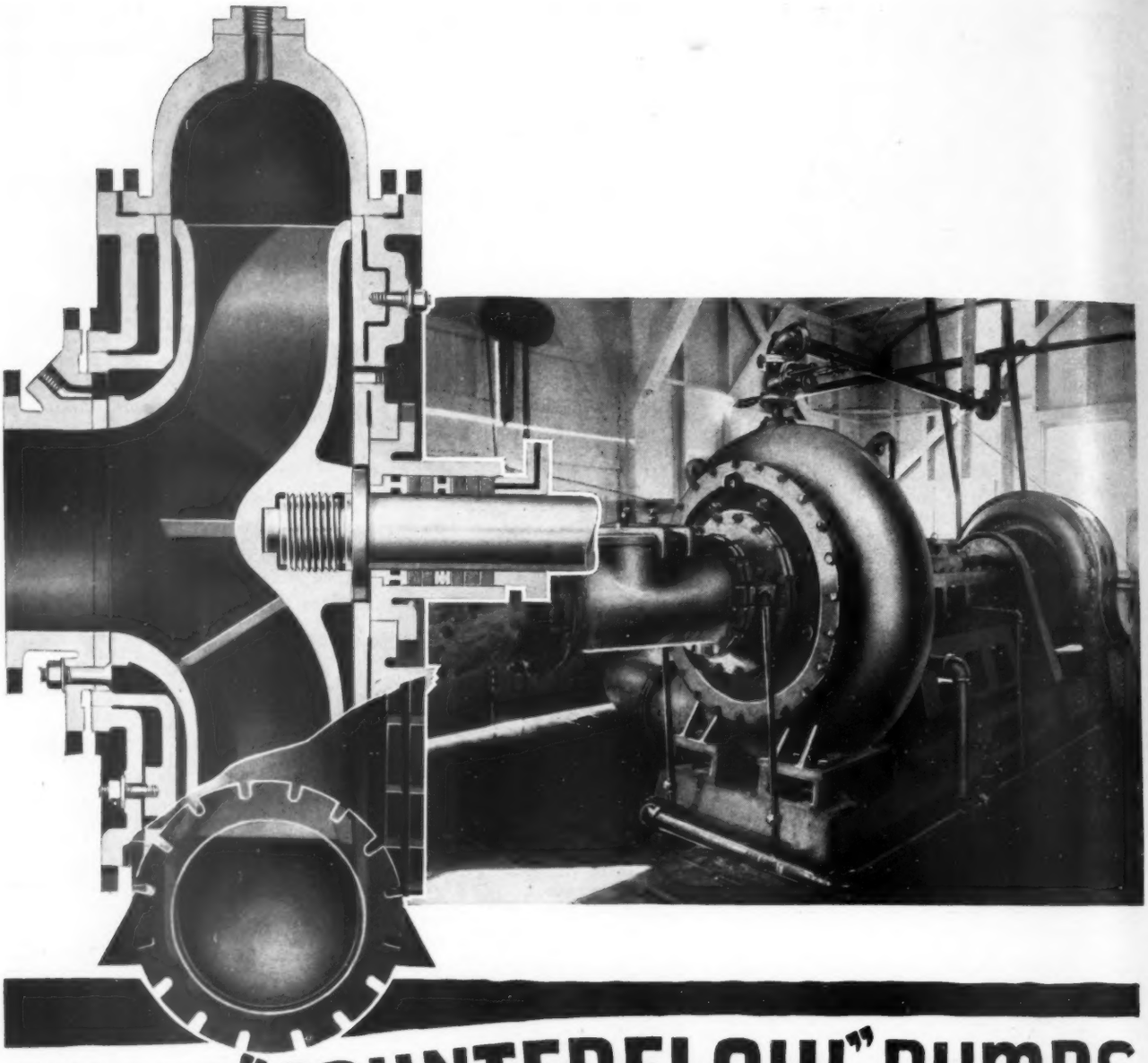
3738 East 78th Street — Cleveland, Ohio, U. S. A.

Cable Address "ROCKDRILL"

Spare Parts Stocks Maintained in the Principal Cities and Mining Centers

LEADERS IN DRILLING EQUIPMENT



AMSCO "COUNTERFLOW" PUMPS

Long recognized as the leading maker of abrasive material handling pumps, AMSCO now offers a major design improvement in the "COUNTERFLOW" Pump. The result of years of experience, the "COUNTERFLOW" Pump combines several new design advantages with the correct application of manganese steel, "the toughest steel known."

The "COUNTERFLOW" Pump features: a wide funnel-mouth impeller; threading of the impeller bore; elimination of internal leakage; *and most important — greatly reduced internal wear* accomplished by providing clear water, under pressure between the impeller shrouds and the shell side plates. This AMSCO feature introduces clear water between the shrouds and plates with a "counter-flow" action, replacing sand-laden water which is a cutting compound, with clear water which is a lubricant — thus the name, the AMSCO "COUNTERFLOW" Pump.

This new design is not only available in all sizes and types of new AMSCO Pumps, but practically all pumps now in service may be converted at nominal cost to take advantage of "COUNTERFLOW" features.

Write for details on AMSCO "COUNTERFLOW" Pumps and how to increase the life of your old pumps by making "COUNTERFLOW" changes!

AMERICAN MANGANESE STEEL COMPANY

Division of American Brake Shoe & Foundry Company

377 East 14th Street, Chicago Heights, Ill.

Foundries at Chicago Heights, Ill.; New Castle, Del.; Denver, Colo.; Oakland, Calif.; Los Angeles, Calif. • Offices in Principal Cities

AMSCO

TRADE MARK REGISTERED

NEW Bucyrus-Erie 19-B

5/8 Yard Convertible Excavator

Here is a fast, strong, powerful 5/8-yard excavator that is setting new standards in high-speed output in its field. The efficient, fast-moving, modern 19-B is built along the same lines as the famous 3/8-yard 10-B, the fastest-selling excavator in the world.

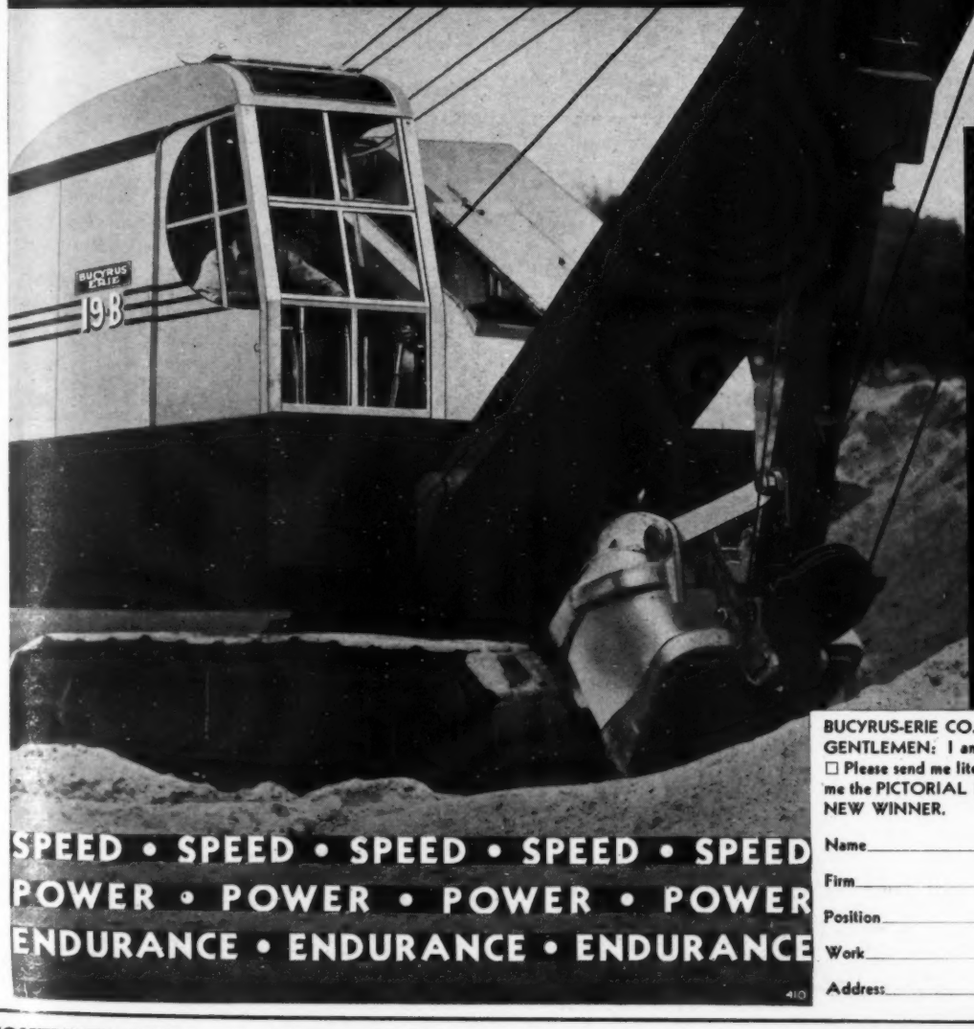
Find out all about this remarkable 5/8-yard machine today . . . write, or mail coupon below, for full details.

The 19-B is modern in appearance; modern in design and modern in performance . . . weighs 16 tons; travels 1¾ M.P.H.; swings 4¾ R.P.M. on hooked, conical rollers; 37 anti-friction bearings; automatic lubrication; gas or Diesel power.

BUCYRUS-ERIE

BUCYRUS ERIE

EXCAVATING, DRILLING AND MATERIAL HANDLING EQUIPMENT...SOUTH MILWAUKEE, WISCONSIN, U.S.A.



Another Winner with the 10-B's famous:

- high-speed cycle for big output
- efficient application of power for low-cost yardage
- compact design for maximum stability
- strong, rugged construction that stands up to heavy digging
- elimination of deadweight to set free power and increase speed
- convenient, quick convertibility . . . all types of front-end equipment
- dependable, economical day-in-and-day-out operation

SPEED • SPEED • SPEED • SPEED • SPEED
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410

BUCYRUS-ERIE CO., SOUTH MILWAUKEE, WIS., U. S. A.
GENTLEMEN: I am interested in the NEW 5/8-YARD 19-B.
☐ Please send me literature or ☐ have a representative show me the PICTORIAL PRESENTATION OF FACTS ON THIS NEW WINNER. R.P.

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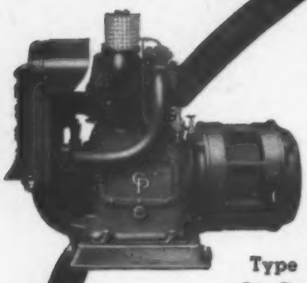
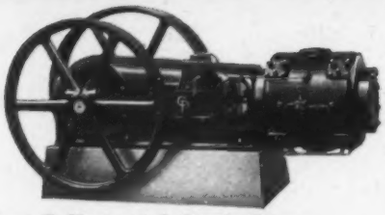
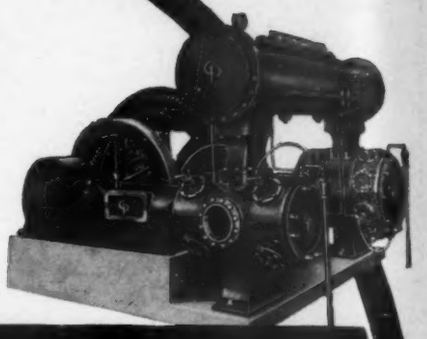
CHICAGO PNEUMATIC
AIR and GAS
COMPRESSORS



Type PM Two-Stage
Air-Cooled Compressor
With Built-in Motor



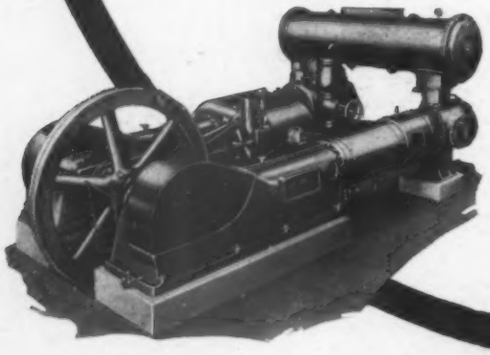
Type T Horizontal Single-Stage
Belt-Driven Compressor



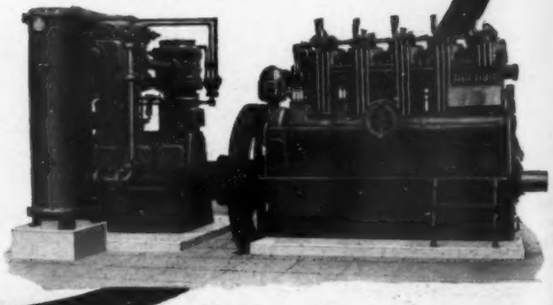
Type O Two-Stage
Direct-Connected Electric
Motor-Driven Compressor

for GREATER EFFICIENCY
UTMOST RELIABILITY
LONGER LIFE
UNUSUALLY LOW MAINTENANCE

Type O Compound Steam-Driven
Two-Stage Compressor



Type V Vertical Two-Stage
Compressor Direct-Connected
to CP Diesel Engine



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A SIZE, TYPE AND DRIVE FOR EVERY REQUIREMENT

WE'LL BE LOOKING FOR YOU

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at the

Twenty-First Annual Convention

of the

NATIONAL SAND and GRAVEL ASSOCIATION

Those perplexing problems of yours and of the whole industry will be discussed. Hear what the other fellow has to say about them—what remedies are offered and go back with those invaluable suggestions that stop losses and make for added profits.

There will also be an exhibition of modern machinery and equipment used in the production, distribution and consumption of sand and gravel.

Hotel PEABODY— Memphis, Tenn.

December 7, 8, 9 and 10, 1936

BE SURE TO COME!

NATIONAL SAND AND GRAVEL ASSOCIATION

MUNSEY BUILDING
WASHINGTON, D. C.

PRIZE OFFER NO. 1

Open to Rock Products Plant Owners, Superintendents, Foremen, Engineers, Chemists, Etc.

ROCK PRODUCTS ANNUAL PICTORIAL REVIEW NUMBER

JANUARY, 1937

PHOTOGRAPHS WANTED

1. New 1936 Plants in the Rock Products Industry.
2. Additions or Improvements to Existing Plants Made in 1936.
3. New Ways or Methods of Processing Developed in 1936.
4. New Machinery Installations in 1936.

These photographs should be on a scale large enough to show considerable detail.

PRIZES . . .

For the best photograph (which has not previously been reproduced) showing typical 1936 development:

$100.00 First Prize
$ 50.00 Second Prize
$ 25.00 Third Prize

In case of two photographs of equal merit, the same prize will be awarded for each.

Contest closes December 24, 1936.

Payment For All Photographs Accepted

For all photographs reproduced in Rock Products Annual Pictorial Review Number (January, 1937), besides those winning the three prizes, the Editor will pay

$4 for an 8x10 print.
$3 for a 5x7 print.
$2 for smaller sizes if the negative also is sent.

All photographs, used or not, will be returned **on request.**

Send all photographs to the Editor of Rock Products **with** a letter telling what they illustrate, and mark them "Rock Products Pictorial Review Contest."

Rock Products **205 W. Wacker Drive**
CHICAGO, ILLINOIS

PRIZE OFFER NO. 2

Open to Superintendents and Plant Operating Men

ROCK PRODUCTS ANNUAL PICTORIAL REVIEW NUMBER

JANUARY, 1937

Wanted: "HINTS AND HELPS" *Articles*

■ The Editor of Rock Products will pay five cash prizes of $50, $40, $30, $20 and $10 for the best, second, third, fourth and fifth best brief articles on how ingenious superintendents or operating men have solved a plant problem, or operating problem, during 1936.

■ Write your story in pencil or ink or on a typewriter; illustrate it with photographs, blue print or pencil sketch.

■ Send it to the Editor of Rock Products before December 24, marked "Rock Products Hints and Helps Contest Entry."

All Articles Used Will Be Paid For . . .

Any article submitted and found suitable for publication will be paid for at space rates of $5 per column of Rock Products, including illustrations.

This offer is open to all operating men in the industry, whether subscribers to Rock Products or not.

Rock Products 205 W. Wacker Drive CHICAGO, ILLINOIS

ANNOUNCING

Twentieth Annual Convention
National Crushed Stone Association

Netherland Plaza Hotel • Cincinnati, Ohio
JANUARY 18, 19 and 20, 1937

In conjunction with which will be held

THE MANUFACTURERS' DIVISION EXPOSITION OF MACHINERY, EQUIPMENT, AND SUPPLIES

THE Annual Convention of the National Crushed Stone Association has, during the years since its inception, become recognized as an event of outstanding significance to crushed stone producers individually and to the industry as a whole.

It serves, as no other medium can, to develop, crystallize, and express industry opinion. It signifies solidarity of purpose and the ability of those engaged in the same line of activity to unite in the solution of common problems.

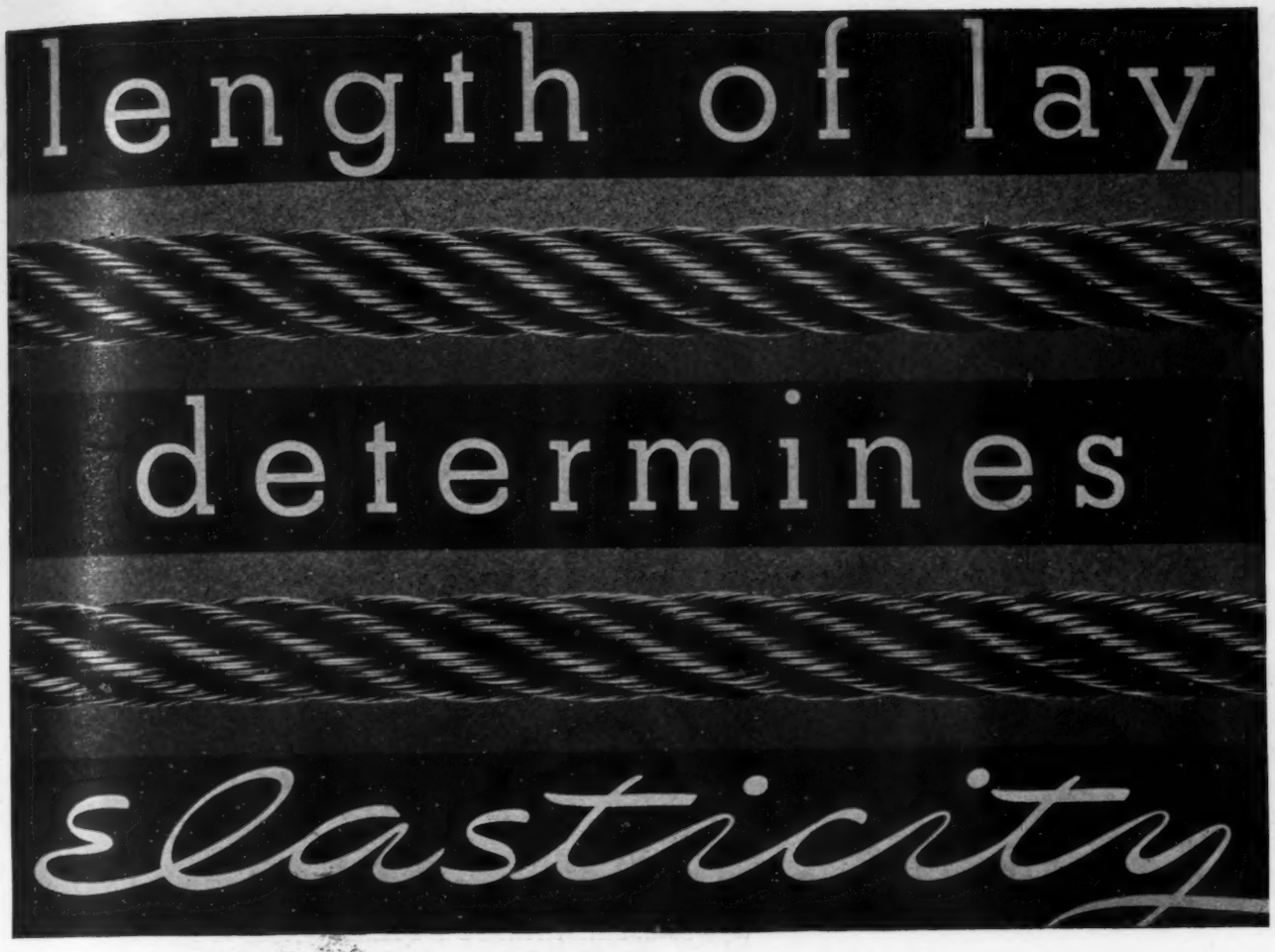
As individuals, producers will find much to reward them for a visit to Cincinnati next January: Speakers of outstanding reputation and experience will discuss problems of timely interest, both technical and legislative; opportunity will be afforded for the mutually beneficial exchange of opinions with fellow-producers, to say nothing of the pleasure to be derived from renewing old acquaintanceships; the Manufacturers' Division Exposition will command studious attention for the helpful suggestions to be obtained from an inspection of the latest developments and improvements in machinery and equipment used in the crushed stone industry.

ALL crushed stone producers of the United States and Canada, whether or not members of the National Crushed Stone Association, are cordially invited to attend our Twentieth Annual Convention. Make your plans now to be present at Cincinnati on January 18, 19 and 20, 1937.

For further information write to

NATIONAL CRUSHED STONE ASSOCIATION
1735 Fourteenth Street, N. W. . . . Washington, D. C.

length of lay determines elasticity



Select the Rope that Fits Your Job

Elasticity must not be confused with stretch. The ability of a rope to resume its normal length after elongation enables it to bring a moving load up to speed gradually, thereby preventing shock. Length of lay, the distance along the rope axis required by one strand to make a complete revolution, determines elasticity. Shortening this distance increases the elasticity but reduces the strength of the rope. Careful consideration to the rope use should be given when determining the length of lay. We will gladly furnish you with data on the subject to aid your selection. Write.

●

WICKWIRE SPENCER STEEL COMPANY, *General Offices:* 41 East 42nd Street, New York. *Sales Offices and Warehouses:* Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles; *Export Sales Dept.:* New York.

WICKWIRE SPENCER SALES CORPORATION, New York, Chattanooga, Tulsa, Portland, Seattle.

WIRE ROPE
by Wickwire Spencer

WICKWIRE SPENCER STEEL CO.
41 East 42nd St., New York City
Please send me your new Rope Manual that tells how to make wire rope last longer.

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Firm_____

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City_____ State_____ R.P.

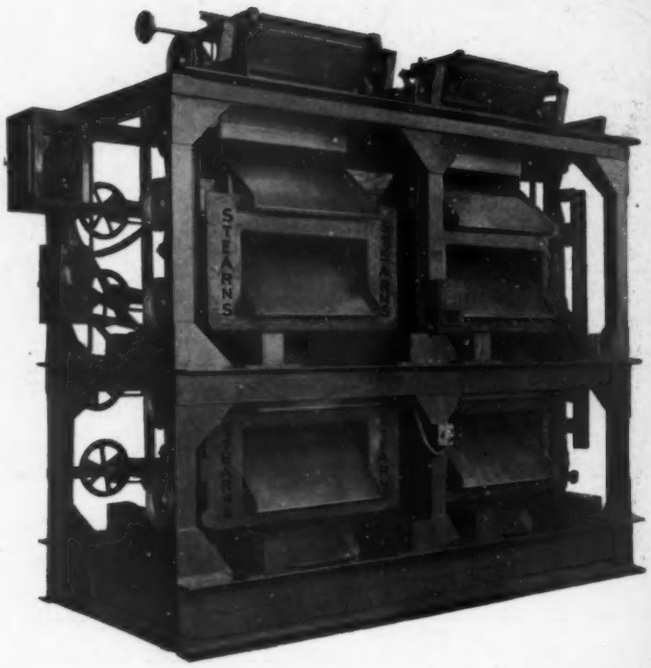
P. J. Weisel, Inc. Knows How *!

"..made it possible to produce sand within the iron(Fe) limit set by the glass companies."

P. J. Weisel, Inc., outstanding Pacific Coast glass sand plant, produces a sand which is being used in the processing of crystal glass. An exacting purification is necessary.

Stearns Type "K" High Duty Magnetic Separator of the Induction Principle is enabling the Weisel plant to keep iron content below the limit set by the glass companies. It is a compact, all steel unit designed and perfected by Stearns engineers with thirty-five years of magnetic separation experience.

Stearns Type "K", operating on the induction principle, provides positive magnetic separation of materials heretofore considered unresponsive to such separation. It offers intense magnetic fields with lower input and correspondingly low current consumption.



End and front elevation of a 60", 5-field, Type "K" Induction Separator, showing motor operating switch and push button remote control; operating protector switch for coil windings, also discharge chutes for magnetic materials. Weight 28,400 lbs.

It is flexibly arranged to provide one or more stages of magnetic separation, according to requirements. It offers sufficient capacities to make an installation of this kind very profitable. It is fully automatic and gives continuous performance.

* See article on page 36.

Our laboratories are at the disposal of engineers and others interested in tests (ask for our Bulletin No. 100) of this or other magnetic separators. Write

HIGH STEARNS DUTY

MAGNETIC EQUIPMENT
CLUTCHES — BRAKES

STEARNS MAGNETIC MFG. CO.
624 South 28th Street
MILWAUKEE, WISCONSIN

Rock Products

WITH WHICH IS INCORPORATED CEMENT and ENGINEERING NEWS FOUNDED 1896 . . .

Volume XXXIX | Chicago, November, 1936 | Number 11

Still a Problem

THE PICTURE below could well be labeled "An Editorial Without Words." It shows over 4000 men applying for 95 jobs, advertised as open to truck drivers in the New York City Department of Sanitation. The men are lined up in front of the Municipal Building on the morning of September 9.

It proves that many men out of employment *really want* to work, in spite of numerous insinuations that the relief rolls are loaded with habitual loafers. And driving a garbage truck can hardly be considered an attractive opening.

This issue of ROCK PRODUCTS goes to press on the eve of a so-called epoch-making general election. But, no matter which party wins the Presidency, we still have with us the crying need of a speedy cure for unemployment.

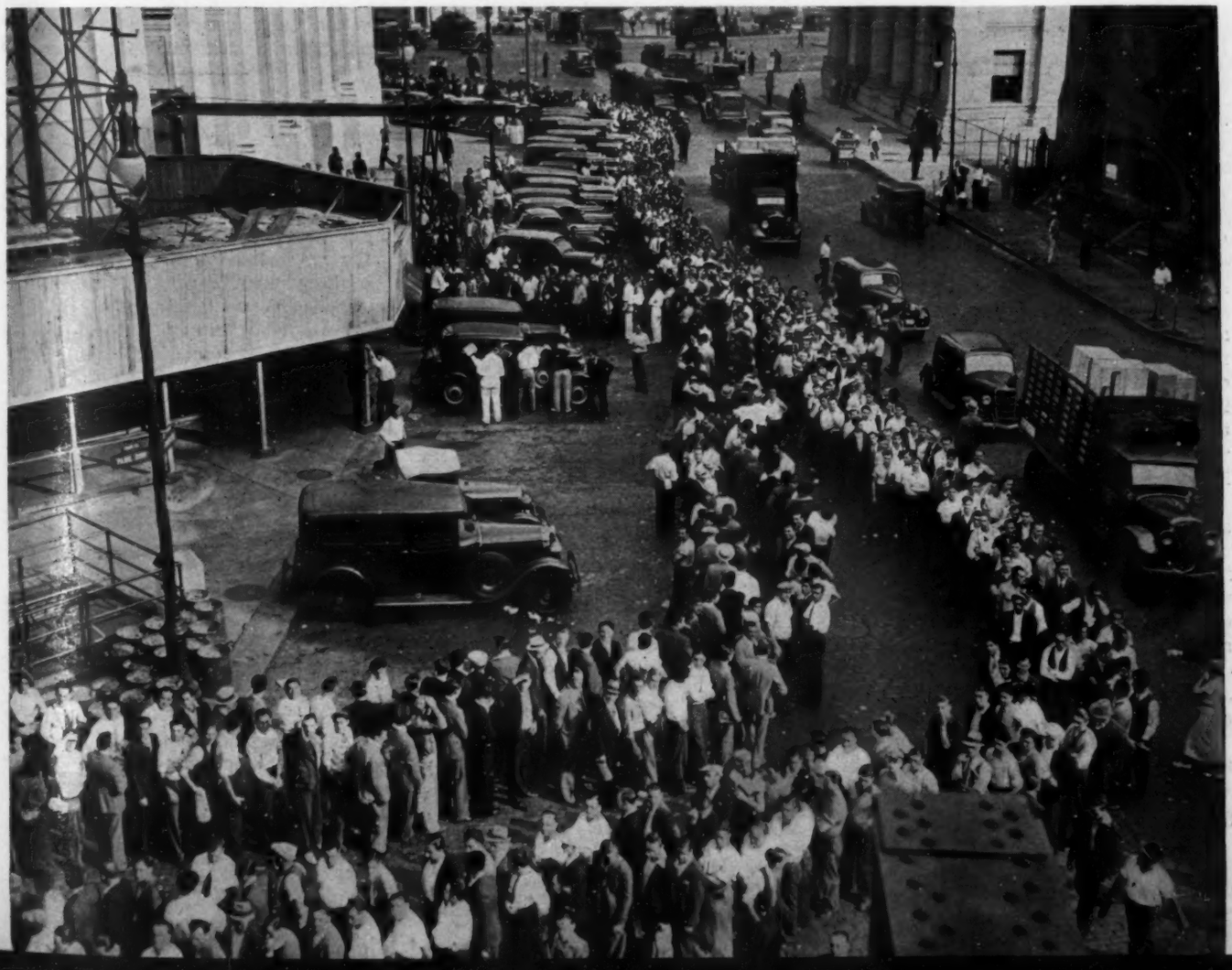
Private industry must find that solution, or there will be revolutionary changes in capitalistic industry, with or without federal government intervention. No right-minded business man can be complacent over election returns when millions of men who want to work can not.

There has been much bitterness and much perversion of truth in the last days before election. Issues have been confused, perhaps in many cases purposely. In the heat of his campaign for reëlection the President has been subjected to abuse that in a normal frame of mind every real American would detest.

All those of us who believe the Constitution of the United States adequate to the solution of our present social and economic problems, *as a people,* must prove it. We must prove that a theory of government designed for a country of a liberty-loving, self-reliant breed of mankind still has a citizenry, liberty-loving and self-reliant.

Our Constitution was designed for a country of farmers and small business men, who *could* be economically independent and self-reliant. It was not designed to meet a situation of big business and continuous unemployment in great cities, where few can be economically independent and self-reliant. The problem is to preserve enough of our self-reliance to preserve our Constitution.

Four thousand men apply for 95 jobs in New York City — Acme Photo



Employs Physical Examinations

MONARCH CEMENT Co., Humboldt, Kan., early in October instituted physical examinations among all employes, including officials and executives. The work is being done in coöperation with the Portland Cement Association and under the direction of the Saranac Laboratories of Saranac Lake, New York.

Dr. L. U. Gardner, nationally-known authority in the field of industrial medicine and director of Saranac Laboratories, spent two days at the plant in preparation for the physical examination survey. Dr. D. M. Brumfiel of Saranac Lake, who is associated with Dr. Gardner, conducted the examinations. Assisting in the survey were Messrs. T. N. Durkan and D. S. McCrum of Saranac Lake, and P. N. Bushnell of the Portland Cement Association. Dr. J. J. Michalak of Humboldt assisted in the examinations and will handle the work in the future.

At the conclusion of the examinations each employe was advised of any physical condition which might need attention, and it was suggested to him that he consult with his own family physician. In the future all new employes of the company will receive a physical examination on employment which will furnish a guide for the proper placement of such employes in work best adapted to their physical capacities.

Would Save Capital Surplus

NATIONAL GYPSUM Co., Buffalo, N. Y., stockholders will meet November 20 to vote on increasing the authorized 5% non-cumulative $20 par preferred stock from 26,000 shares to 58,000 shares, in order to pay a $2.50 stock dividend to common stockholders. M. H. Baker, president, in letter accompanying the meeting notice said: "The company has had a very satisfactory earning record so far this year and the board of directors believes the common stockholders are entitled to dividends from earnings accruing this year but because of the company's cash requirements, it would be unwise to pay any dividends in cash.

"While the company now enjoys a strong cash position, substantial expenditures are anticipated early next year for capital improvements in bringing the three plants acquired from Atlantic Gypsum up to our standards and for additional working capital to carry receivables and inventories that will result from the materially larger sales expected next year.

"The payment in stock will permit the company to retain its earnings in the business without subjecting itself to heavy taxes and thereby provide funds for necessary improvements and working capital without additional financing.

"Tax experts have advised that this method of payment complies with the purpose of the revenue act of 1936 and the dividend being taxable income to the recipient, should eliminate the necessity of the company paying out about $100,000 as a tax on undistributed profits, provided the stock is authorized and in stockholders' hands before the year closes."

Seek to Combat Imported Cement

NEW ENGLAND railroads have petitioned the Interstate Commerce Commission to inaugurate lower rates for cement from points in trunk line and New England territory to Boston, Mass., to meet competition of imported cement. This imported cement entering the United States through Boston, chiefly from Germany, Belgium and Denmark, was described by the carriers as a "growing menace," not only to the New England cement market for Eastern producers, but to the railroads themselves.

Production Continues Up

PORTLAND CEMENT INDUSTRY in September produced 12,292,000 bbl., shipped 12,564,000, and had in stock at the end of the month 18,648,000. Production and shipments showed increases of 71.4 and 61.1%, respectively, as compared with September, 1935. Stocks at mills were 14.4% lower than a year ago.

The total production for the nine months ending September 30, 1936, amounts to 83,700,000 bbl.; compared with 56,066,000 in the same period of 1935, and the total shipments for the nine months ending September 30, 1936 amounts to 83,700,000 bbl., compared with 55,650,000 in the same period of 1935.

The statistics here given are compiled from reports received by the Bureau of Mines, from all manufacturing plants except six, for which estimates have been included in lieu of actual returns.

In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 160 plants at the close of September, 1936, and of 162 plants at the close of September, 1935.

RATIO (PERCENT) OF PRODUCTION TO CAPACITY

	September 1935	1936	Aug. 1936	July 1936	June 1936
The month	32.6	57.1	56.2	51.3	52.3
The 12 months ended	27.3	38.1	36.1	34.0	32.7

Robinson-Patman Act Complaint

UNITED STATES QUARRY TILE Co., Canton, Ohio, has been charged by the Federal Trade Commission with violation of the Robinson-Patman act. This is a clay tile manufacturer, but the case involves practices common to many building product manufacturers, who sell both to building supply dealers and building contractors, in the rock products field.

The complaint did not specifically charge that granting discounts to wholesalers in general was a violation of the act. It charged that the granting of discounts to "so-called wholesalers" who "are in fact retailers" was a violation. The "so-called wholesalers" are retailers, the commission said, because they resell glazed tile bought at a discount from the Tile company to the ultimate consumer and are thereby in direct competition with tile contractors.

"The discrimination in price herein referred to," the commission said, "is brought about by the respondent allowing a 15% discount on all glazed tile, regardless of quantity sold to so-called wholesalers, which discount of 15% is denied to tile contractors. The said so-called wholesalers are in fact retailers in that they resell said tile to the ultimate consumer and are thereby in direct competition in the sale of tile with the tile contractors."

The Tile company was given 20 days in which to answer the complaint. The hearing on the case will be held in Washington on November 20.

Wisconsin Code Cost

FOR REGULATING the conduct of the crushed stone, sand, and gravel industries of Wisconsin the state government will charge members of the industry $15,000 for the next year.

Governor La Follette's approval of the assessment levied on the industry by the Wisconsin trade practices commission paved the way for beginning of collections. Estimated expenses of policing the industry are listed at $14,740.

Of the total, $2000 will go to the trade practice committee in fees and expenses and $3600 to a deputy commissioner to administer the code.

Group Insurance

MEDUSA PORTLAND CEMENT Co., Cleveland, Ohio, executives announced at a dinner given to key men of its Bay Bridge, Ohio, plant, at Sandusky, recently, that the company is taking out a $1,000 life insurance policy for each of its employes who have been with the company six months or longer, the premium to be paid by the company as long as the employe remains with it.

Foresees Building Boom

NATIONAL GYPSUM CO., Buffalo, N. Y.: President M. H. Baker returned recently from several weeks in England where he made a study of building conditions. In discussing this trip, he said "England is now going through the greatest building boom in her history. Shortage of homes, obsolescence and other conditions affecting housing in England are quite similar to those in this country. Because of our larger population I believe a building boom much greater than that in England is long overdue here."

The company has just completed the purchase of Craftex Co., a subsidiary of Atlantic Gypsum Products Co., whose plants were recently taken over by National. Craftex is the pioneer in texture wall paints and during recent years has developed the use of casein as a base for interior finishes in a full line of colors.

In announcing this purchase, Mr. Baker pointed out that the company has no intention of getting into a regular paint business but that Craftex lines of specialties combined with the company's present finishes will give "our customers a full line of low cost finishes to sell with our plaster and other types of wall and ceiling materials." Craftex is understood to be doing an annual business of about $300,000, on a profitable basis, and in addition to supplying the building material trade in this country it has an established business in Canada, England, Norway, Sweden and France. This purchase was made entirely with Class A common stock of National Gypsum Co.

New Sales Executives

UNITED STATES GYPSUM CO., Chicago, Ill., has announced the appointment of W. L. Keady, as vice-president in charge of sales, to succeed Charles F. Henning, who died October 3 following an automobile accident. Mr. Keady formerly was vice-president in charge of operations, is a member of the company's board of directors, and is widely experienced in all phases of the company's business.

L. H. Atkinson, formerly assistant to the vice-president in charge of sales, has been appointed general sales manager. In addition to his experience with USG, Mr. Atkinson has been sales manager of the Wood Conversion Co., and before that vice-president and general manager of the Red Top Steel Post Co., a subsidiary of the Inland Steel Co.

M. H. Basquin, formerly divisional production manager, has been appointed general manager of operations.

Dates to Remember

KEEP these important dates in mind:

***CONVENTION** of the National Sand and Gravel Association at Peabody Hotel, Memphis, Tenn., December 7, 8, 9 and 10, 1936. All producers in the industry are invited, whether members of the association or not. The program will include an open forum for frank discussion of all subjects affecting the welfare of the industry.*

• • •

***CONVENTION** of the National Ready Mixed Concrete Association at Peabody Hotel, Memphis, Tenn., December 11 and 12.*

• • •

***CONVENTION** of the American Road Builders' Association and American Road Congress at New Orleans, La., January 11-15, incl., 1937*

• • •

***CONVENTION** of the National Crushed Stone Association, Netherlands Hotel, Cincinnati, Ohio, January 18, 19 and 20, 1937. All crushed stone producers, whether members of the association or not, are invited.*

Installing Dust Collectors

NEW YORK TRAP ROCK CORP., New York City, and GENERAL CRUSHED STONE CO., Easton, Penn., are reported to be installing Norblo dust collectors in New York State plants—the latter at its Syracuse dryer plant.

White Cement Marketed

CALAVERAS CEMENT CO., San Andreas, Calif., has completed various changes and improvements for the production of white portland cement. MacDonald Engineering Co., Chicago, had charge of construction, including new silos.

Resumes Production

SOUTHERN FELDSPAR CO., Spruce Pine, N. C., reopened its McNeill mine in Mitchell county about October 15.

Rock Wool

GYPSUM, LIME AND ALABASTINE, CANADA, LTD., Paris, Ont., has completed an addition to its plant at Caledonia, Ont., to make "GypRoc-Wool."

Pay Increase

CALIFORNIA PORTLAND CEMENT CO., Colton, Calif., according to local reports, made a 5c per hour increase in all wages, beginning September 15.

Continuing Exploration

MARQUETTE CEMENT MANUFACTURING CO., Chicago, Ill., which announced intentions some months ago to move part of its Oglesby, Ill., plant to a site in Mississippi, if quarry property it had acquired proved adequate, is still investigating the limestone deposit between Redwood and Haynes Bluff on the Mississippi River. Samples will be shipped by the carload to the Cape Girardeau, Mo., plant for testing.

Lime Production Up in 1935

STATISTICS compiled by the U. S. Bureau of Mines show lime sold or used by producers in the United States in 1935 amounted to 2,987,133 short tons valued at $21,748,655, according to figures from reports furnished by lime manufacturers. This represents an increase of 25% in quantity and 27% in value compared with 1934. Sales of hydrated lime, which are included in the above totals, amounted to 1,005,619 tons valued at $7,939,513, an increase of 21% in quantity and 26% in value. The average unit value of all lime in 1935 was $7.28 a ton compared with $7.16 a ton in 1934; hydrated lime showed an increase from $7.63 a ton in 1934 to $7.90 a ton in 1935. The total number of plants that reported operations in 1935 was 301 or 23 less than in 1934, due chiefly to the nonoperation of field kilns and the closing of small plants.

Plant Addition

VICTOR MICA CO., Spruce Pine, N. C., has completed a $50,000 addition to its plant.

Good Season's Run

J. L. SHIELY CO., Cole, Mont., plant for Fort Peck dam concrete aggregates turned out about 850,000 cu. yd. of sand and gravel during the 1936 construction season, which ended October 15. This output was divided as follows: 394,000 tons of sand, 216,000 cu. yd. of fine gravel, 260,000 cu. yd. of coarse gravel. Since the start of the project the plant has supplied 643,000 tons of sand, 395,000 cu. yd. of fine gravel, 487,000 cu. yd. of coarse gravel.

Resumes Production

MONARCH CEMENT CO., Humboldt, Kan., resumed production late in September after two months' shutdown.

SUCCESSFUL *Pacific Coast* GLASS SAND PLANT

P. J. WEISEL, Inc., CORONA, CALIF., KNOWS HOW

MUCH SILICA sand has been imported from Belgium and shipped from parts of the United States, to supply the glass factories of the Los Angeles area. Attempts to produce it from local deposits have not been very successful, except for the operation of P. J. Weisel, Inc., Corona, Calif. By magnetic separation and dust removal, in addition to very thorough washing, this producer has succeeded in making a product that meets the very rigid requirements.

The deposit is of coarse sand, or fine gravel mixed with sand, and is semi-cemented, not hard enough to be called hardpan, but hard enough so that it is profitable to drill and blast before sending to the mill. No crushing is required to disintegrate it.

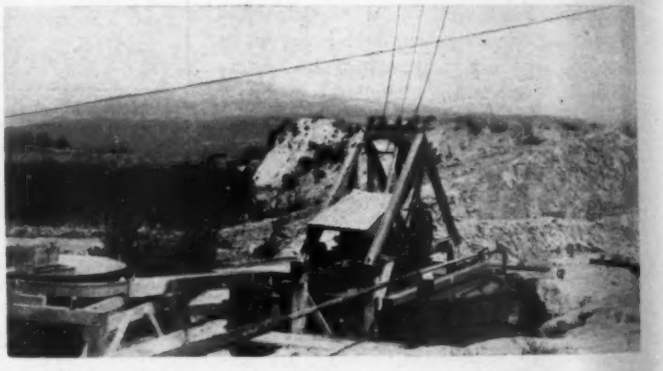
By Edmund Shaw
Contributing Editor, Los Angeles, Calif.

There are really two deposits, one on either side of the highway from San Diego to Corona, six miles from Corona. Both have been prospected to 100 ft. depth, the depth of the present working. According to estimates made by an outside engineer, there is more than 2,000,000 tons of glass sand in the proved ground.

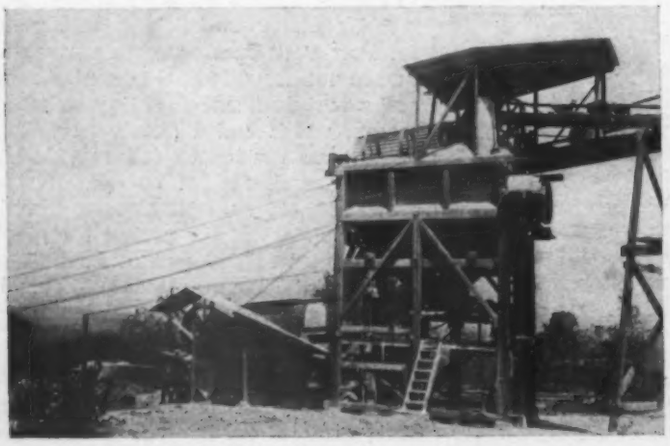
Blasting and Loading

Two men do all the blasting and loading of the bank material. Holes are drilled with electrically powered augers of the type used in coal mining, which drill 4 ft. per min. All are "snake holes," 16 ft. deep. One set is put in at the bottom of the face, horizontally but at an angle of 45 deg. with the face. The remaining holes are set in a row 4 ft. above the bottom holes, and staggered with them. These upper holes are at

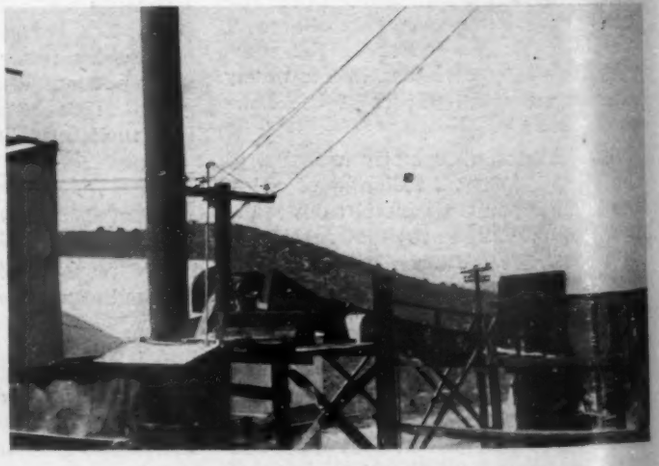
Disposal of tailings at silica sand plant



The 16-ft. thickener which is key to irrigation of orange grove



The revolving grizzly, hopper and scrubber

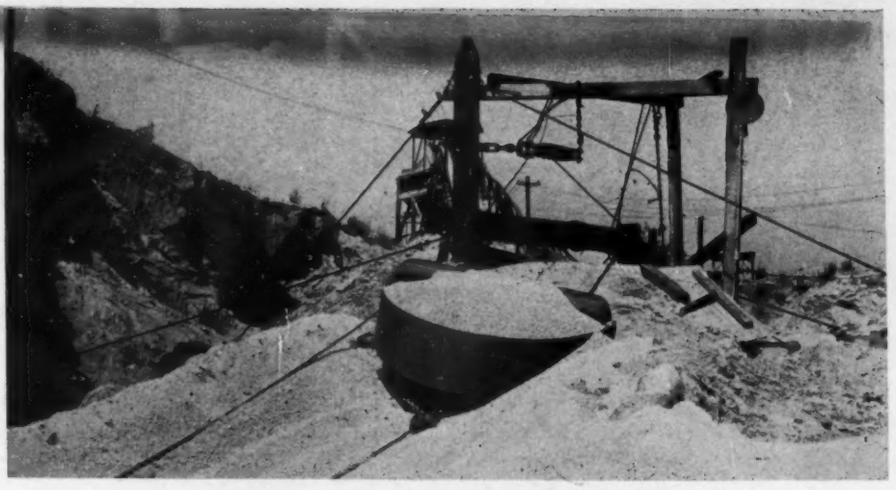


Conveyor that feeds drained sand to dryer

right angles to the face but slant downward so that the bottom of the hole is on a level with the bottom of the face.

The holes are 2-in. diam., loaded with "40% Extra" dynamite, and usually shot 16 at a time with "Dreadnaught" caps and fuse, although sometimes electric detonators are used.

Recent experiments have been made with well-drill holes, using the home-made drill that was built for prospecting. The success with this method was such that it may be adopted for future blasting. These holes were set 18 ft. apart and 18 ft. from the face, and were 100 ft. deep. They were loaded with 200 lb. of dynamite, one-third of the charge in the center and the remainder in the bottom of the hole.



Power scraper on rail grizzly, Corona, Calif.

Transportation to the Plant

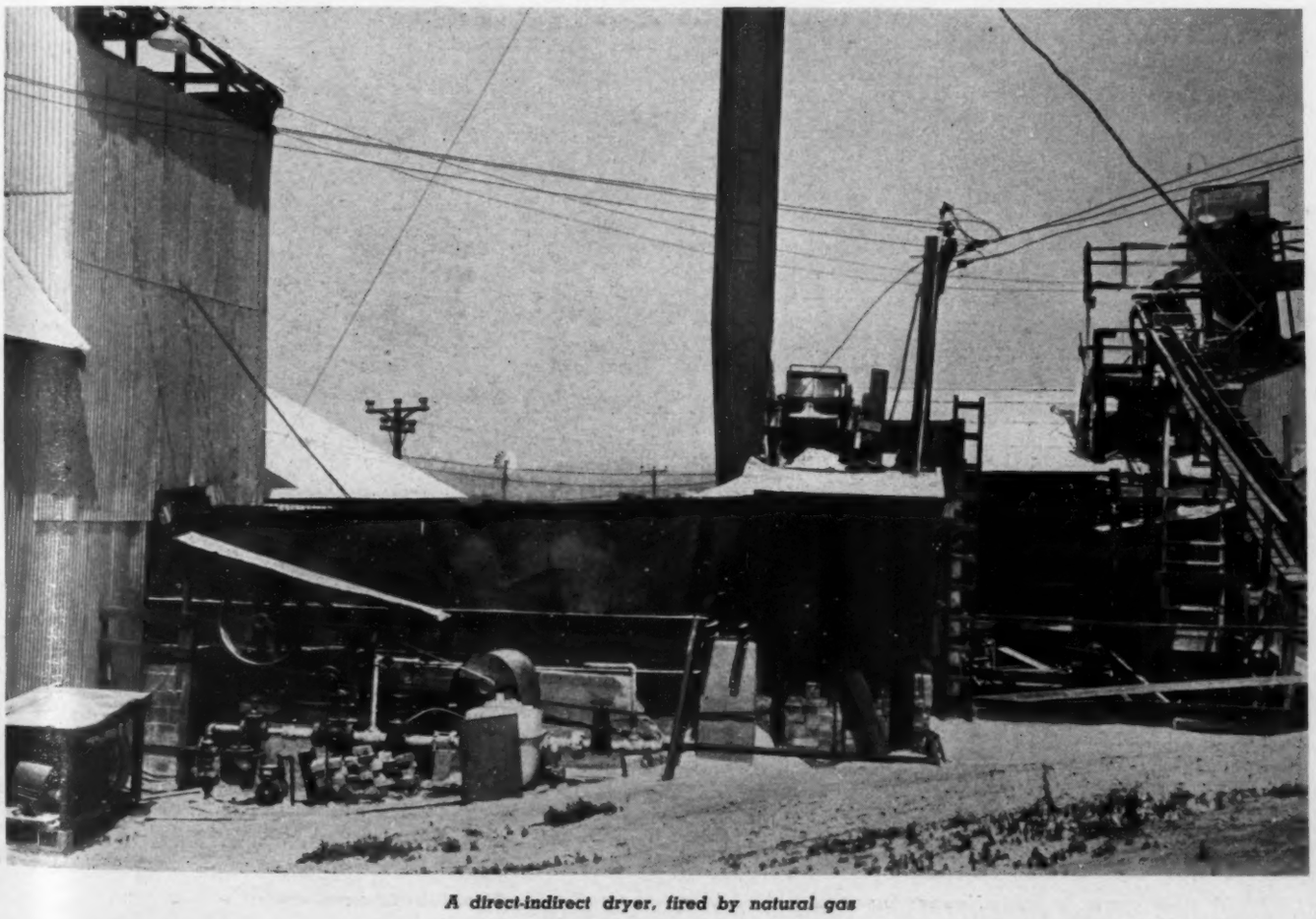
The broken material is dug by a Sauerman Crescent power scraper, drawn by a hoist with a 50-hp. motor. The scraper is drawn up a runway of 90-lb. steel rails, which are set 12 in. apart, to discharge into a 6x6-ft. hopper. The upper part of the runway serves as a grizzly; material is allowed to fill in below the lower part. Lumps that will not pass between the rails are broken by hand.

The hopper is above the lower end of an inclined 24-in. belt conveyor, 250 ft. centers. It is carried by a trestle which has about a 1 to 3 inclination. Plain cast-iron idlers, greased by hand, are used on this conveyor, as they have been found to give better service in this situation than some types of anti-friction idlers which were tried.

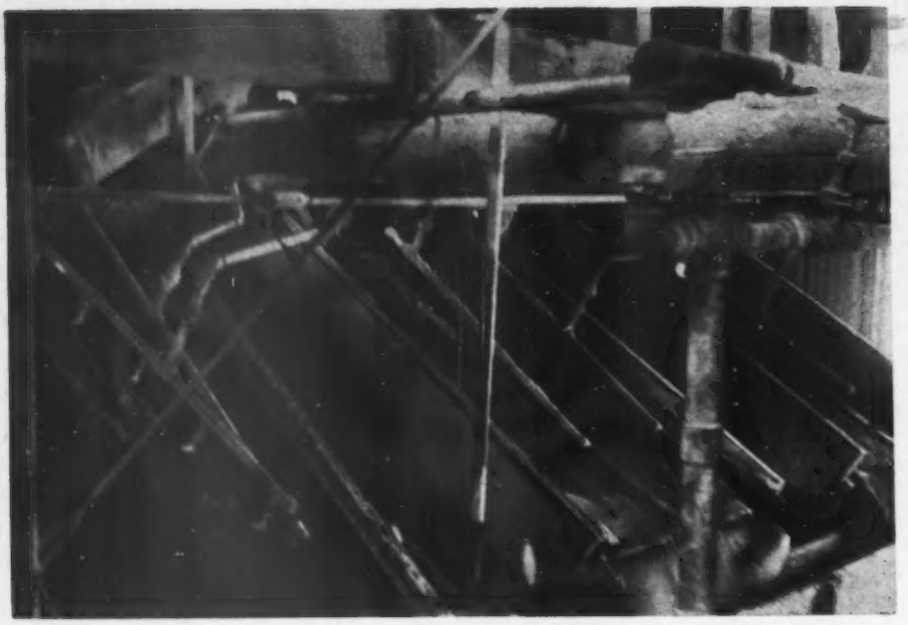
Preliminary Screening

The conveyor discharges into a revolving rod-grizzly on top of a structure about 40 ft. high. This grizzly is made of old 1½-in. pump rods, set to leave 4-in. clear spaces. The purpose is to get rid of some lumps of hard clay and to break up the semi-cemented lumps of sand and clay so that they can be better dealt with. The clay lumps fall to a waste pile, the undersize goes to a hopper 10x10 ft.

At the bottom of this hopper is a Chain Belt feeder which delivers into a scrubber, 5 ft. long and 4 ft. diam., and about 300 g.p.m. water is added. This is on the same shaft as a trommel, 11 ft. long and of the same diameter as



A direct-indirect dryer, fired by natural gas



The 30-mesh plant screens in the glass sand circuit

the scrubber of which it is an extension. The trommel has ½-in. round holes, and practically everything passes them. What little oversize there is falls to the ground and is removed from time to time.

Grinding, Screening and Washing

The trommel discharge goes to a 16-in. diam. Telsmith screw washer, 12 ft. long. The overflow, heavy with clay and fine sand, goes to a 7-ft. cone to settle out the heavier particles and then to a 16-ft. thickener which clarifies the water for use in the plant. The sand goes to a paddle washer, something like a log washer, except that it has flat paddles alternating with the inclined blades. This is run as a scrubber, without an overflow. Then it goes to a 3x6-ft., double-deck Cottrell vibrating screen, with heavy sprays to clean off the clay loosened by the washers. The oversize and undersize of the screen go to a homemade rake-type washer and then to the tube mill. The intermediate product, all passing 6-mesh and retained on 14-mesh, is for blast sand, and it goes to a paddle washer and then to an 8-ft. Hardinge mill, which is run without pebbles to scrub the sand thoroughly without grinding it.

The tube mill (made by the Denver Engineering Co.) is 18 ft. long and 6 ft. diam. outside. Both it and the Hardinge mill are lined with Belgian silex blocks which last about a year. The tube mill uses No. 3 and No. 4 Danish pebbles, and no good substitute has been found for these imported pebbles. The thickness of the lining makes the internal diameter of the mill about 5 ft., when the blocks are new. The load line is between one-third and one-half of the diameter, and a 50-hp. motor turns the mill without swinging.

The blast sand from the Hardinge mill goes to a Dorr classifier, 18 ft. long, with 32-in. rakes. Then it goes by a 36-ft. centers, bucket elevator to a 3x6-ft. Overstrom vibrating screen This is covered with 30-mesh wire cloth. The oversize goes to a drainage bin to be drained and dried, as the glass sand is, and the undersize goes to a washer in the glass sand circuit.

The tube mill product goes to a drag belt washer, 16 ft. long, with a 10-in.

Homemade screens and washers between the trommel and the tube mill

belt and 18-in. flights. All the drag belts in the plant were made in the plant shop. They have wooden boxes and the pulleys are carried in bearings set on the edges of the box. The belts are all 10-in. wide, in one case less than half the width of the flights. The drive is so that the tight side of the belt does the digging, which is more convenient, but there is greater danger of breaking a belt when the box is full of sand. However, because of the even feed the washers are seldom overloaded.

This washer is followed by a 16-ft. Dorr classifier and a pair of paddle washers placed side by side. Then the pulp goes to a revolving distributor that divides the feed into thirds for the three main screens. Two of these are 3x6-ft. Cottrell, and the third, of the same size, is a screen designed and built by Robert Rawson, the plant foreman. The frame is set on four spiral springs and is opposed by four spiral springs in its upward motion. It is vibrated by a pulley out of balance, and the amplitude can be varied by changing weights on the pulleys. The purpose in designing it was to get away from any whipping motion of the screen, and give a longer life to the screen cloth. In this it has been successful, for the cloth has about twice the life that it has on the other screens.

The oversize of these screens is rescreened over two 3x6-ft. Tyler "Hummer" screens. The oversize goes back to the tube mill by gravity, and the undersize of all the screens is washed in a drag belt and elevated to another drag belt. This also receives the fine sand collected in a 10-ft. thickener, which is pumped to it by a Frenier pump, 54x8-in. The overflow of this thickener, which takes the overflows of all washers beyond the tube mill, is pumped to the scrubber and trommel at the head of the plant by a 4-in. Byron-Jackson centrifugal pump. The glands of this pump are protected by water from a 2-in., two-cylinder pump, with a 4-in. stroke.

The washed sand falls from the last washer to a drainage bin where it piles up on the floor. A man operating a sort of power scraper, except that it is flat, moves the sand occasionally to a 9-in. screw conveyor with 9-in. flights. The speed of this screw sets the feed to the dryer. It discharges into the boot of an elevator which discharges on to a 12-in. conveyor belt, 30 ft. centers, that feeds the dryer.

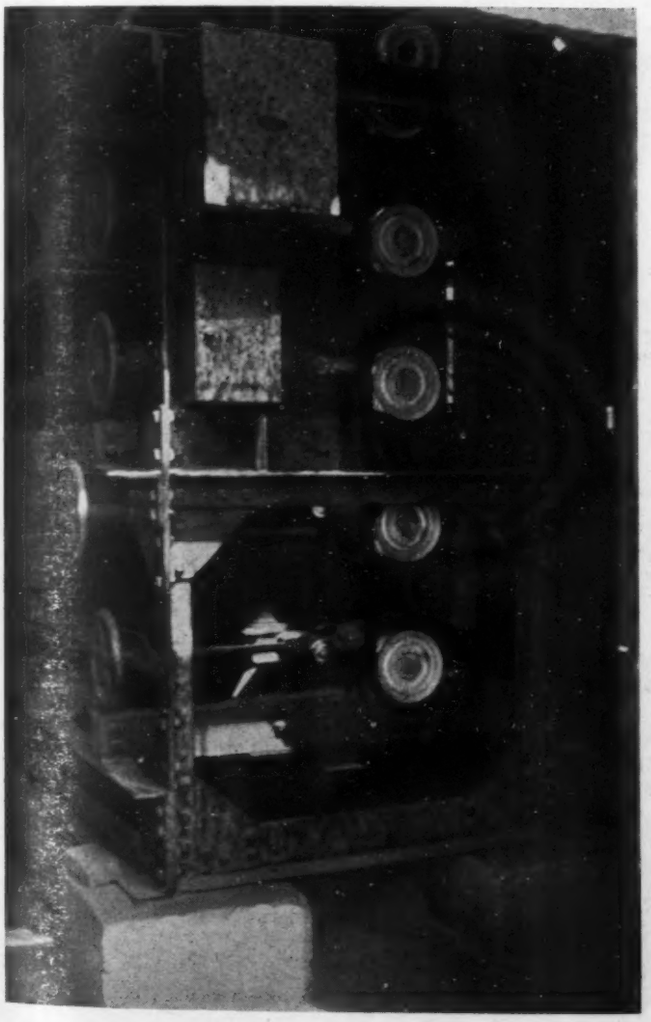
The dryer, made by the Madsen Iron Works, is 20 ft. long and 6 ft. diameter. It is of the direct-indirect type and uses about 33 cu. ft. per min. of natural gas for fuel. The capacity is about 6 tons per hour, varying with the weather. Not all the sand is dried, as some of it is sold for polishing and other industrial purposes not affected by dampness.

The dried sand is elevated in a chain and bucket elevator, steel enclosed, to a Hum-mer screen, 3x6-ft., covered with 16-mesh wire cloth. This is to remove such foreign matter as chips and bits of wood, and occasional large pieces that get into the sand in passing through the mill.

Processing Dried Sand

The undersize of the screen goes to a cooler and dust remover, designed and built by Mr. Rawson. It is a box 6 ft. long and 2 ft. wide. At one end is a reducing section, terminating in a 4-in. pipe, connected to a Buffalo suction fan. At the other end is a screen through which air is drawn by the suction. The feed comes in over a roller, which keeps it falling uniformly and like a thin curtain. The air passes through this, removing the dust and cooling the sand. The discharge of the fan goes to a cyclone collector outside of the building, which builds up a waste pile. This dust is salable for several uses.

After passing the dust remover the sand goes to a Stearns type K, high duty, induction, magnetic separator. It was the introduction of this machine that made it possible to produce sand



LEFT—Magnetic separator for production of sand with less than .04% iron

BELOW — Portable screen under bins feeding portable conveyor for loading trucks

with less than 0.04% iron (Fe), the limit set by the glass companies.

The electro-magnets are straight, and the poles terminate in pieces which are grooved to receive soft iron rollers. On the other side of the rollers is the soft iron frame that completes the magnetic circuit, with an opening through which is the pan on which the sand passes out.

The rollers, being in the magnetic field, are magnetized and they hold any magnetic particles until a neutral point is reached and then they drop them. The non-magnetic particles fall off at once and in this way the separation is made. The first separation is a rough one, and it is followed by two which clean the waste very thoroughly.

The separator removes a great deal more than the metallic iron which may get into the sand in passing through the mill. This is only a small part of what is discarded. Garnet, mica, both black and white, and grains of mixed silica and iron form the greater part of the discard, although there are always bits of dried clay included. But everything that is taken out contains a little iron, and discarding it helps to keep the iron down to the low limit demanded by the glass factories. The waste goes to the suction of a Buffalo fan and is blown out to a waste pile.

The sand, both damp and dried, is received in bins which are on posts over a concrete pavement where a truck may be placed to load from any bin. Usually, however, the bin discharges to a portable, 3x6-ft. Cottrell screen, which removes any foreign matter that may have got into the bin. The undersize of this screen goes to a 30-ft. Jeffrey portable conveyor, with a 12-in. belt. This screen is sometimes used to split blast sand into two sizes. The oversize falls on the pavement and is removed in wheelbarrows.

The waste coming from the 16-ft. thickener falls into an old working. The water flows down to an orange grove below, where it is used for irrigation. The solids are removed and piled by a homemade cableway dragline. This disposal of the waste is paid for by the owner of the orange grove.

In addition to overflow of the screw washer, the 16-ft. thickener takes the overflows of the other washers before the tube mill. These all flow to a sump from which they are raised to the thickener by a 54x8-in. spiral (Frenier) pump. The overflow of the thickener is pumped to the plant water circuit by a 1½-in. high-speed, Gardner-Denver pump.

The office of the company is at La Habra, Calif. P. J. Weisel is president of the company and the principal owner. The manager of the operation is G. A. Van Valin.

Capital Increase

SMELTER SAND AND GRAVEL CO., El Paso, Tex., has increased its capital stock from $7500 to $50,000. John Wood is president of the company, Hugh McMillan, vice-president; K. M. Linker, secretary-treasurer.

"Coals to Newcastle"

APPLETON, WIS., surrounded probably by more sand and gravel producers than any other city of equal size in the U. S. A., is reported seeking a municipal gravel pit.

Mate Negligent

MATERIAL SERVICE CORP., Chicago, Ill., lost its Diesel-powered sand and gravel carrier, *Material Service*, in Lake Michigan off Chicago on July 29 (see ROCK PRODUCTS, August, 1936, p. 51). Recently the ship's first mate pleaded guilty to charges of negligence, inattention to duty and lack of skill, before the local board of Federal steamboat inspectors. Among other charges he was alleged to have failed to secure the hatches properly, so that water got into the cargo of gravel, causing it to shift and capsize the ship. The captain and 14 members of the crew were lost.

Tugboat Recovered

TENNESSEE VALLEY SAND AND GRAVEL Co., Sheffield, Ala., refloated its tugboat *Jayhawker*, which sank at the company's wharf at Florence, Ala., September 11. A diver was required to make repairs to its bottom, which had scraped on a rock.

Changes Owners

LAKE GENEVA SAND AND GRAVEL CO., Fontana, Wis., has been purchased by Max Jahnke, formerly with Moulding-Brownell Co., Algonquin, Ill., sand and gravel plant; and will be rehabilitated and operated by him.

Successful First Season

CONSOLIDATED GRAVEL CO., INC., Columbus, Ga., was organized in November, 1935, and completed its plant on Bull creek early in 1936, to have a capacity of about 1000 tons of sand and gravel per 10-hr. day. Since beginning operation the plant has furnished sand and gravel for much local asphalt paving, aggregates for 25 miles of concrete paving for state highways, and 20,000 tons of sand-clay mixture for local paving base course. Recently an order was taken for 22,000 tons of sand for the TVA dam at Chickamauga and 20,000 tons more of sand-clay mixture for the city of Columbus.

The equipment of the plant includes a 130-hp. Caterpillar Diesel engine-electric generator unit, 6-in. dredge pumps made by the Georgia Iron Works, Link-Belt bucket elevator, Climax jaw crusher, Acme Road Machinery Co. rotary screens. The company has six trucks, used for delivering materials locally.

Officers of the Consolidated Gravel Co., Inc., are: R. D. Smith, president; L. N. Bickerstaff, vice-president; Jesse P. Calhoun, secretary and treasurer.

Fair Enough!

CLARK COUNTY, WASHINGTON, is being asked by the state to pay a tax on sand and gravel produced by the county-owned plant and sold to contractors. The county commissioners claim they sell the output at cost.

Penal Gravel Plant

SHELBY COUNTY, TENNESSEE, is going into the sand and gravel business near Memphis with a sand and gravel dredging plant operated with prison labor.

Business Humming

WISSOTA SAND AND GRAVEL CO., Eau Claire, Wis., is reported as having operated 24 hours a day for the last several weeks to supply aggregates for concrete highway paving.

Sand and Gravel Contract

HARRY ROUTH, Cache, Okla., has been awarded a sub-contract to supply about 50,000 tons of sand and gravel for paving U. S. 62 from Lawton west 12 miles.

Plant Completed

RADCLIFF GRAVEL CO., Cedar Grove, Miss., has completed and placed in operation a new sand and gravel plant.

In Production

GOLDEN SAND AND GRAVEL CO., Golden, Miss., C. D. Carter, president and general manager, has completed installation of additional machinery and began production late in September. The method of handling is unusual. A dragline with clamshell bucket excavates the material, deposits it in a pool and it is pumped from the pool to the top of the plant.

Shipwreck

NATIONAL SAND AND MATERIALS, LTD., Toronto, Ont., steamship *Sand Merchant* was sunk in a storm on Lake Erie, October 18, with the loss of 19 lives of crew and one woman passenger, the wife of the first mate. The vessel, both a suction dredge and carrier, was en route from Point Pelee to Cleveland with a cargo of 3000 tons of sand. It is believed heavy seas shifted the cargo.

Sand and Gravel Industry Safety Program That Produced Results*

By Franklin K. Wills,

Superintendent, Van Sciver Plant, Warner Co., Philadelphia, Penn.

OUR PROGRAM is simple in structure, effective in practice. I have subdivided it into five main divisions:

(1) *Care used in the hiring and placing of men.*

(2) *Elimination of unsafe practices of operation.*

(3) *Getting the "safety idea" home to the employe.*

(4) *The value of good employer-employe relations.*

(5) *Good housekeeping.*

(1) *Care Used in the Hiring and Placing of Men*

A wide variety of jobs or trades are included in every sand and gravel plant's personnel. Dredge operators, deckhands, screen tenders, oilers, tugboat and barge men, locomotive engineers, bucket line operators, car loaders, crane operators, firemen, shovelmen, blacksmiths, welders, electricians, riggers, machinists, clerks, carpenters, railroad men (including brakemen, track foremen and laborers), and, if you have river dredges, you may even have to hire someone who will pass as a cook.

With so many different trades involved a most careful selection of men and subsequent vocational adjustment of them is necessary. I, personally, interview all men in our own plant. Wherever possible, their record for the past five years is obtained relative to type of work, habits and qualifications.

Physical Examinations for All

The selected employe is then subjected to a rigid physical examination by a physican before employment. After employment, these physical examinations are given periodically. In the case of re-employment a man is re-examined if he has not worked for over two months. If he has worked elsewhere he is re-examined regardless of the length of absence. I honestly feel that these periodical exams have their psychological effect. They make a man feel that his health is an important item and that he must keep fit if he is to hold his job. I don't know how true it is with other companies, but in our own location very few of the men would ever get to see the inside of a doctor's office if it were not for these examinations. The charge is only $2 or $3 and all re-examinations are half price.

* A paper delivered at the Quarry Section meeting, National Safety Congress, Atlantic City, N. J., October 7, 1936.

Editor's Note

THE Van Sciver plant of the Warner Co. has won so many of Rock Products' trophies in the annual safety contests of the National Sand and Gravel Association that the editor has lost count.

Therefore, Superintendent Wills' methods deserve careful reading and study by all owners and superintendents in the sand and gravel industry.

This is no doubt a general routine with many of you, but since the proper selection and placement of an employe is the foundation of safety work, it is worth repeating many, many times.

It is often said that only a man with a strong back and a weak mind will work in a sand and gravel plant. I think, that for jobs requiring a strong back, you should look for a chap with a strong back *and* a strong mind. But, for the job that does not necessarily require a strong back, give the second-class man a chance. There are very few physically perfect men, so we must all coöperate in our fair adjustment of the less strong fellows.

Pride in Plant's Record

After the prospective employe has gone through the necessary physical requirements and is ready to report to work, the plant superintendent and his assistants should have a heart-to-heart talk with him along safety educational lines. In our plant we point out the safety record and explain all the rules, giving the new man the feeling that it is a disgrace to get hurt. The newcomer is then introduced to his foreman, who points out the hazards present and the safe way to do the particular job. Right here I wish to again emphasize the importance of thoroughly training a man for an unfamiliar job.

A good safety program suggestion for the larger plants, and I dare say one of the easiest ways to absorb a "green" man into the plant routine, is to place him in the labor gang, which is in no direct contact with the operation of the plant. While in this gang, he has a chance to see the operation from a safe distance and gradually absorb some of its dangers. When the opportunity presents itself, and the new man has had time to acquire experience with the plant manner of work, he is promoted to the operating department, where the hazards are greater.

The Man for the Job

This method also enables the labor gang foreman and plant officials to get a better slant on the man's qualifications and general human factors. When selecting men to run cranes and to operate other plant machinery, choose only those who are levelheaded, calm and collected at all times. It is an unsafe practice to have an excitable fellow's hand on the controls of a piece of machinery around which other men work.

If we have a dangerous job to do, such as replacing a broken head wheel assembly, which is 100 ft. above ground level and weighs 15 tons, we know the exact men to put on this job. They must first be 100% safety-minded, must be good riggers, handy with tools, and must have good dispositions. They cannot afford to get excited if things go a bit screwy.

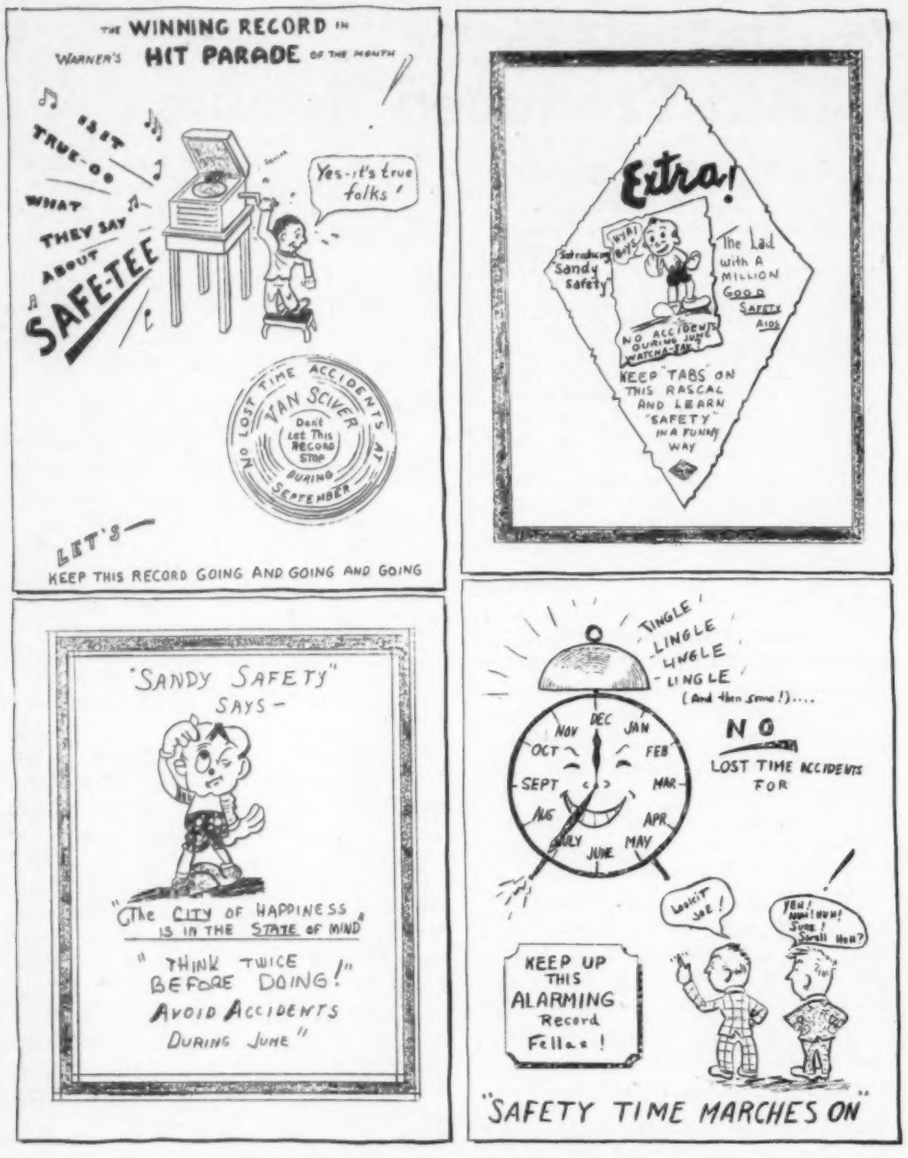
I mention the head wheel assembly because I saw an outside construction gang drop this unit during the erection of the plant. The gang was composed of men without the necessary qualifications.

Do not use men who are unfamiliar with the work or who are mentally and physically unfit to handle it

(2) *Elimination of Unsafe Practices of Operation*

Just before the NRA had been declared unconstitutional, a large and scattered group of representatives of the Crushed Stone, Sand and Gravel, and Slag Industries met in Washington to draw up a set of minimum health and safety standards for their industries. The purpose of these standards was to provide reasonable safety for life, limb, and health of workers. They were intended to serve as a guide for both employer and employe. If any of you have not read these proposed standards I suggest that you do so, as many worthwhile thoughts may be obtained from them—far more than I could possibly take time to cover here.

Referring again to our own Van Sciver plant, the following are a few suggestions which we have adopted to cut out accidents. I have about eighteen


THE WINNING RECORD IN
WARNER'S HIT PARADE OF THE MONTH
IS IT TRUE-OO
WHAT THEY SAY ABOUT SAFE-TEE
Yes-it's true folks!
LOST TIME ACCIDENTS
VAN SCIVER
Don't Let This RECORD Stop
DURING SEPTEMBER
LET'S—
KEEP THIS RECORD GOING AND GOING AND GOING
Extra!
Introducing Sandy Safety
The Lad with A MILLION Good Safety Aids
NO ACCIDENTS DURING JUNE MATINEE
KEEP TABS ON THIS RASCAL AND LEARN "SAFETY" IN A FUNNY WAY
"SANDY SAFETY" SAYS—
"The CITY OF HAPPINESS IS IN THE STATE OF MIND
"THINK TWICE BEFORE DOING!"
AVOID ACCIDENTS DURING JUNE"
TINGLE LINGLE LINGLE LINGLE
(And then some!)....
NO
LOST TIME ACCIDENTS FOR
KEEP UP THIS ALARMING Record Fellas!
LOOKIT JOE!
"SAFETY TIME MARCHES ON"

Samples of Warner Co.'s mimeographed cartoons

listed here so it might be best for you to note only those in which you are interested.

Eighteen Precautions

(1) Since the portable power cables on our dredges carry 2300 volts, it is strictly forbidden for anyone to handle them with the power on. We have placed cut-out switches at available locations so that the power can be cut off at short notice. However, the dredges and electrical department are supplied with combination rubber and leather gloves to be used by electricians in extreme emergencies in handling the cables.

(2) We avoid the use of snatch blocks wherever possible in our work.

(3) Handles have been placed on the hooks of our car puller cables to avoid dangers of men catching their hands and fingers.

(4) The men are not allowed to use poles in shifting railroad cars.

(5) No one is allowed to ride on conveyors or bucket elevators, or work on them while they are in motion.

6) Here is a safe practice suggestion arising from one of those unexpected accidents which do happen. In 1925 we had a serious accident at our Manor Plant when a workman rolled a barrel against the control of the rotary screens. There were men working around the trunion wheels of these screens at the time and the unexpected starting caught one of them and he lost his foot as the result. Since that time the circuit breaker on the board ahead of the starter is always pulled on the machinery the men are repairing. Small signs reading "DANGER—MEN WORKING ON THIS EQUIPMENT" are also hung on the starters.

(7) We regularly inspect hoist cables, according to the manufacturers' specifications, on the dredges, cranes, and ladder hoists. Since we have a heavy demand for old cables we are able to install new ones more frequently. This gives us an unusual factor of safety. The old cables are used for fencing, rewrapping pilings, car-pullers, and other places where breaks will not result in human injury. Furthermore, whenever we do any heavy lifting, especially where human lives are at stake, we always take time out to install special cables and slings kept for the purpose.

(8) Life lines and safety belts are used when working over crushers.

(9) A regular inspection of all hand tools is made. If possible, they are repaired. Otherwise they are definitely discarded, thus avoiding a chance of being handed out for use should no other similar tool be available. Believe it or not—this was one of the main reasons for elimination of our lime plant accidents. They discarded their old tools and started a systematic inspection.

(10) Oxy-acetylene equipment should be kept in good condition, and only those properly instructed should use it. A couple of the precautions necessary are:

(*a*) In case of back-fire, shut off acetylene valve at once, then oxygen. Cool blow-pipe and blow carbon out with oxygen before relighting. (*b*) Do not use over 15 lb. acetylene pressure at any time.

(11) Light-weight helmets are supplied to all of the men who may possibly be injured by stray stones falling from conveyors or elevators.

(12) Goggles are furnished to all men. Their use is mandatory when working on jobs requiring them: such jobs as grinding, burning, chipping, scraping, etc. All our goggles are equipped with a special colored lens which, though transparent, offers some protection while working around welding jobs.

(13) Fire may cause untold damage and suffering. Wherever possible, use steel and concrete in construction work. Install adequate fire-fighting apparatus.

(14) Properly guard plant with hand rails, toe boards, machine guards, and adequately wide-tread stairways.

(15) Tugboat decks should have side rails on them to keep the deckhands from slipping overboard during wet weather. There should also be skidboards on the barge decks where men are handling lines.

(16) The small tugs should be fitted with searchlights in addition to the running and cabin lights. Some years

back when our Manor Plant was working on a night shift one of the men fell overboard and it is claimed that had it not been for the handy searchlight they would never have been able to save him.

(17) All privately-owned railroad crossings should be properly safeguarded. Our locomotives blow for all crossings and go over them at reduced speed. All crossings are equipped with distant, fixed danger crossing signs, and at crossings, light signals or bells with swinging arms. Many school busses use these crossings. The engineers are requested to report to the office any bus driver who fails to stop at a crossing when the signal is operating. It has been necessary to report only one bus driver to the local school authorities in the past few years.

(18) On all new construction, make certain that all safety measures and devices have been included. It will pay you to heed this warning.

(3) *Getting the Safety Idea Home to the Employe*

Every plant superintendent must approach this subject in a different manner. The size, conditions and plant personnel affect this consideration. For instance at our Philadelphia retail yards, where the material is distributed to various locations, safety must necessarily be placed on the individuals' shoulders and hence a closer form of education must be followed. This is done through a mandatory set of safety rules. They have numerous bulletin boards so located that every employe will be able to see them.

Posters

The bulletin board should be attractive and not more than four posters placed on it at a time. In addition to the National Safety Council posters we have our own mimeographed cartoons and newspaper clippings or management letters concerning safety. To add interest, use concrete examples wherever possible. If a pair of goggles have saved on eye injury, display them on the board, together with the story of the incident.

Time-off penalties for accidents due to carelessness, or reprimanding committees to show that the company is downright serious about the Safety Business, are the unfortunate measures that the Philadelphia yards are sometimes obliged to take. However, they are effective, so we can say, "It is better to live and learn."

Safety Meetings

At Van Sciver Plant, being more like a single unit, we are able to hold mass meetings in the men's lunch and locker room. There are two safety committees: one composed of all foremen and the other composed of sub-foremen, or No. 1 men in the ranks. We felt that the rivalry created between the two committees would not only spur on the foremen's committee, but that the safety idea would get across to rank and file better if some of their fellow-workers were represented in the safety program.

Each committee studies past accidents, including first aid courses, and devises ways of avoiding recurrences of such accidents. Hazards in and about the plant are discussed and corrections recommended. A short study of First Aid is covered at each meeting. If time permits, some interesting article from the *National Safety News* is briefly covered or some new safety device is placed on display for consideration. It is very important to keep the program moving and to always have interesting ideas at hand if needed.

Company House Organ

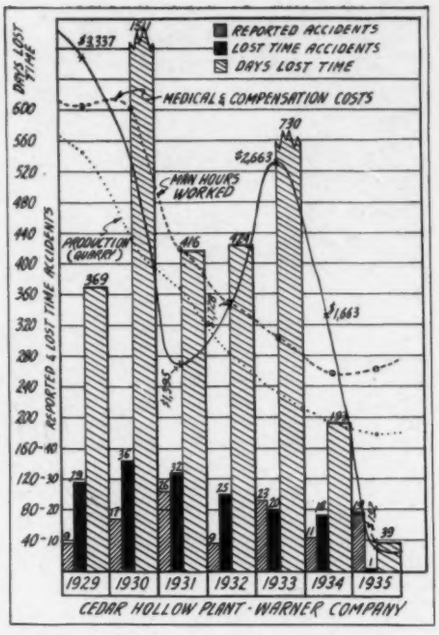
The Personnel and Safety Department issues a monthly *Foremen's Bulletin* which is distributed to all plants. Each issue contains an editorial of general interest; a "First Aid" instruction page; a "Voice of Safety Experience" page, containing illustrated safety devices that foremen have sent in, relating to some accident problems and how they were solved. This is followed by several pages showing the competitive standing of foremen according to severity rates. The last few pages cover a summary of all LOST-TIME and reported accidents, during the previous month.

(4) *The Value of Good Employer-Employe Relations*

Is it not true that a satisfied owner of an automobile likes to boast about his car? He becomes so interested in it that he spends many hours keeping the car in top-notch shape so that he can demonstrate its "better" qualities to his friends. Perhaps he may even wish to show them some little device of his own that he added to the car.

If an employe is happy with his work, his comrades, and general surroundings, he is proud of his company. He has been given a chance to help develop the safety program. Perhaps the company's house organ has honored him for a noteworthy suggestion. Maybe he was in that group picture of no-accident workers. These are subjects of conversation when he is out with his friends.

He is not only proud but interested in his surroundings. He is part of the organization, and that feeling of responsibility encourages greater cöoperation.

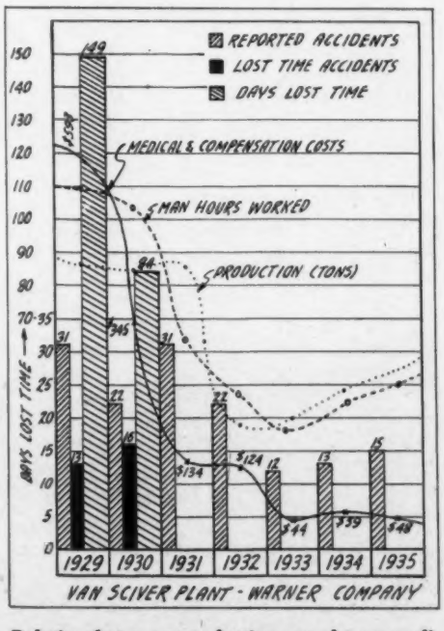

REPORTED ACCIDENTS
LOST TIME ACCIDENTS
DAYS LOST TIME
MEDICAL & COMPENSATION COSTS
MAN HOURS WORKED
PRODUCTION (QUARRY)
DAYS LOST TIME — REPORTED & LOST TIME ACCIDENTS
1929 1930 1931 1932 1933 1934 1935
CEDAR HOLLOW PLANT - WARNER COMPANY

Relation between production, man-hours, medical costs and accidents, Cedar Hollow quarry of Warner Co.

(5) *Good Housekeeping*

Every safety program contains a few thoughts on this topic, but I, personally, feel it is one practice that is seldom seriously considered. It is so hard to use valuable time to clean up yard and plant. We have learned differently. About a half hour each day is spent in keeping our plant ship-shape.

The plant is very thoroughly illuminated for night operation. Floors, steps, and other walkway surfaces should be kept free of oil, water, ice, and snow. In general, materials should be piled so that they will not easily fall or be displaced by vibration.



Relation between production, man-hours, medical costs and accidents, Van Sciver sand and gravel plant

Hand sorting of stone for trucks at Gibbs, Texas, quarry

MEETS SPECIFICATION REQUIREMENT OF WEAR COEFFICIENT 7

With Rock Varying From 3½ to 25

Walker County Stone Co.'s Operation at Gibbs, Texas

AN UNUSUAL ROCK FORMATION has made the plant and operation of Texas' newest crushed stone plant both unique and highly interesting. The stone is of a type to discourage the average operator, but yet is quarried and sold at a profit in competition with that gotten out in more modern plants. The plant is owned and operated by the Walker County Stone Co.

Officers of the company, which has offices in the Citizens State Bank Building, Houston, felt that they had a market for crushed stone.

Stone of any type is rare in the section of Texas north of Houston. After many miles of travel and extensive investigations and test holes, the quarry site was selected at Gibbs, Tex., nine miles north of Huntsville—a very favorable location with respect to a market.

The formation being worked is part of a ridge of quartzite rock, which was traced from the Mexican border in an east by northeast direction to the Louisiana state line. The width of the band of rock and its closeness to the surface varies considerably. At some locations the deposit outcrops on the surface and then dips to the extent that the overburden depth makes quarrying impracticable and unprofitable.

The Gibbs site was selected as the only one where sufficient stone was available close enough to the surface to permit worthwhile operation. It is estimated that 3 or 4 million tons of rock are available.

Unusual Quarrying Methods

Conventional methods of quarrying are out of the question in this quarry because some of the rock is entirely acceptable for use in concrete, some is not so good, and much is worthless as aggregate—and yet all the gradations are present, not with definite separation planes but intermingled with each other. According to owners of the plant, eleven distinct types of unstratified quartzite exist in the quarry being worked, each type varying from the others in its hardness and wearing qualities.

The problem to be solved is to profitably get good rock from a deposit having rock with a wear test ranging from 3.1 to 25, to pass the Texas Highway Department's requirement of a wear test not to exceed 7.

Construction of the plant started in October, 1935, and operation began in March, 1936. Overburden ranges from 1 to 4 ft. in thickness, and rock is being taken out to a depth of 25 ft. Stripping is done by mule and fresno. No attempt is made to select the particular rock to be blasted, because of the intimate mixing of soft and hard rock, which are "shot down" together.

The company does not have its own equipment to haul rock to the crushers. Rock is hauled by Mexicans who own

The Walker County Stone Co.'s quarry at Gibbs, Texas. Note the rock irregularities

their own trucks. Any person who owns a truck or can get one is permitted to haul rock if he wishes.

At the present time 23 Ford model "T" trucks of 1½-yd. capacity, none of which represents an investment of more than $50, are being kept busy feeding the crushers. It is surprising how few breakdowns occur when these old, worn-out trucks are subjected to the wear and tear of hauling rock over rough quarry roads. The method of payment undoubtedly has much to do with it.

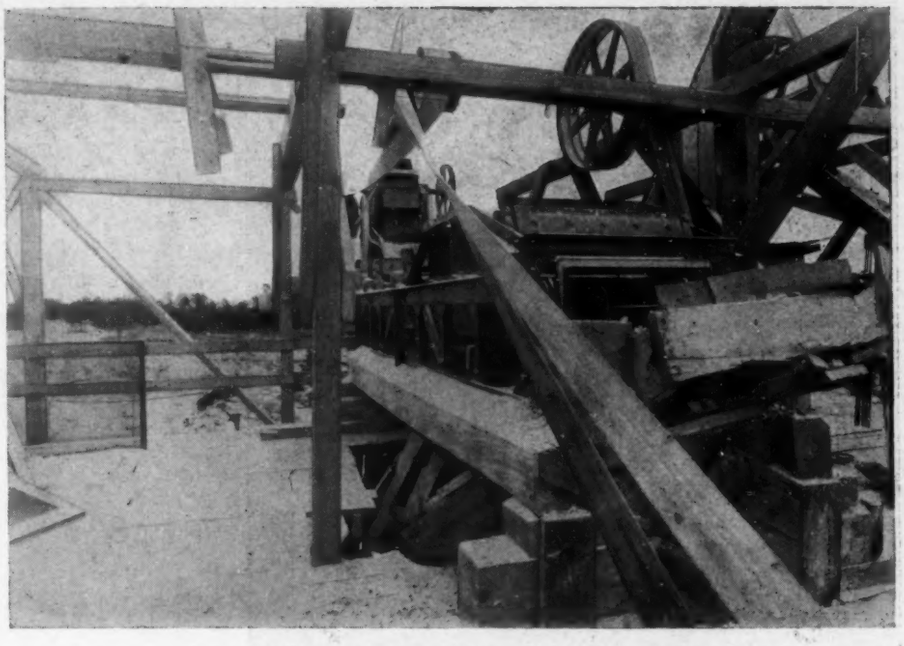
Rock is classified as either hard or soft rock, the rating to be determined by a checker. Generally the drivers work in three groups at widely separated locations in the quarry.

It is the duty of inspectors in the quarry to see that proper separation is made when loading the rock to trucks, and when a load is inspected, it is either hard or soft. If it will meet the specification under which the plant is operating, it goes direct to the crusher. If it does not meet the specification, even though there may be hard rock in with the soft, it goes to the soft rock pile, which is in the quarry where the rock has previously been cleaned out. The quarry floor is kept clean by this method, and one can drive an automobile anywhere over the quarry floor without injury. There is no additional picking over at the crushers or at the screens. All rock that goes to the crushers is inspected; therefore, it meets the requirements and no further inspection is necessary.

In passing out of the quarry, each driver must pass a checker, who grades his load of rock. A card record is kept on each driver. Each load is designated as either soft or hard rock and is recorded as such on the record for the driver for the day.

An added premium is placed on hard rock. The driver is paid 5c more for each load of hard rock than for each load of soft rock. The driver pays the two men who pick and sledge the rock for his truck. Each man knows that a truckload of hard rock will pay him more than one of soft rock, and he learns to select hard rock by eye.

Oftentimes nearly all loads will be of "soft" rock; at other times the reverse may be true. Generally, after a shooting, a great number of loads of soft rock will be hauled out before the hard rock is reached; and then a number of loads of good rock will follow.



New 3-deck vibrating screen in use at quartzite plant

Consequently, the crushers are sometimes swamped with work while at other times they have very little to do. Sometimes as much as 50% to 75% of soft rock is handled to get out the good rock; often the reverse is true. The soft rock is sometimes sold as base material, but it is unfit for concrete.

Crushing Plant

The plant itself has an output ranging from 300 to 1000 tons a day, depending entirely on how the deposit is running. The primary crushers are set below the roadway so that the trucks can discharge directly to them.

Two Gates primary crushers, a No. 6 and a No. 5, are set side by side to accommodate the trucks. Rock is reduced here to 2½ in. and under, and the discharges join at the foot of the 56-ft. centers bucket elevator. The elevator discharges to a 16-ft. by 40-in. triple-deck vibrating screen.

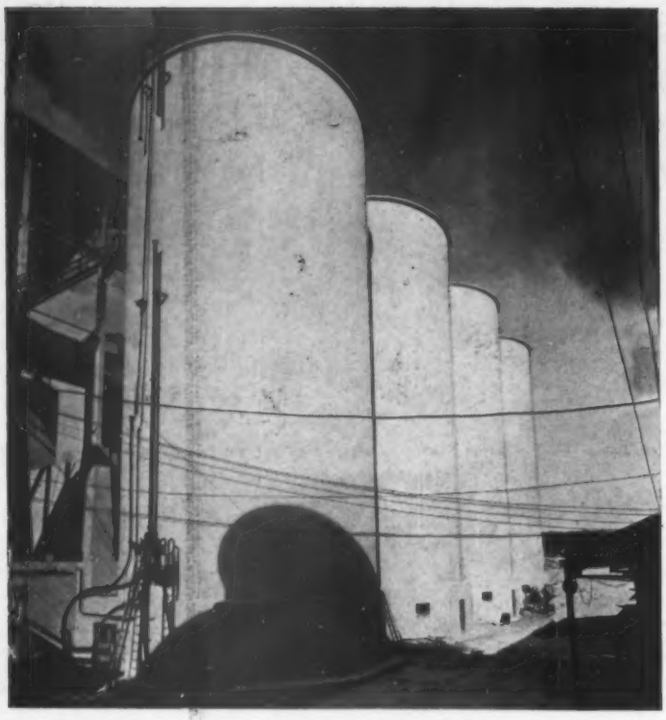
Rock passing the 1-in. openings goes to the bins, and oversize is chuted to a 6-in. McCully secondary crusher set at the level of the primary crushers. Rock sizes from ⅛ to ½ in. and ¾ in. to 10 mesh go direct to the bins. All crushers are driven from a main shaft by a 150-hp. motor. Screens and elevators are driven by a 100-hp. motor.

The product from the secondary crusher is elevated to the top of the plant and passed through a 60-in. by 24-ft. rotary screen for further separation. Rock is stored in eight like bins, totaling 675 cu. yd. About 90% of the plant output is used for concrete aggregate, ballast and asphalt aggregate and is shipped on the Missouri Pacific railroad. The company is fortunate, as far as shipping rates are concerned, in that the rock is 20% lighter than average stone and weighs but 140 lb. per cu. ft.

The plant is electrified throughout, a main line having been run from Huntsville. Wear and tear on crushers is tremendous in producing crushed quartzite. The company maintains a welding and blacksmith shop at the plant and has a skilled welder who is kept busy building up breaker plates and crushing surfaces. Included in the equipment is a 20-hp. arc welder.

C. Westbrook is president; F. L. Dahlstrom is vice-president; and E. A. Cruse is secretary-treasurer. Claude Livingston, superintendent, fortunately has a complete mastery of the Mexican language to aid him in instructing the drivers.

LEFT: The stone crushing plant in Walker county. Truck is dumping into primary crusher. RIGHT: View of crusher



Construction view of new 100,000-bbl. stock house, Universal Atlas Cement Co. plant, Waco, Texas

MORE STORAGE NEW GRINDING PRACTICE

At Universal Atlas Cement Co.'s Waco, Texas, Plant

By Bror Nordberg

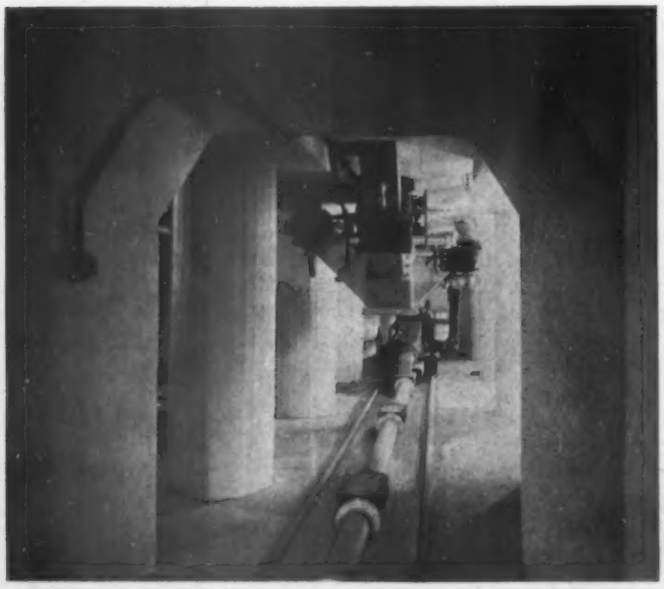
THE FINISHED CEMENT storage capacity of the Waco, Tex., plant of the Universal Atlas Cement Co., a subsidiary of the United States Steel Corp., was increased by 100,000 bbl. when four new reinforced-concrete stockhouses were completed recently.

Ability to store this large volume of both regular and special cements will enable the company to provide more continuous employment, since it will allow operations during dull seasons when the plant formerly was shut down. Due to advance storage being built up, it also will benefit users by making possible quick shipments even in the busiest seasons.

The new silos are 80 ft. high and 40 ft. in diameter, each having a capacity of 25,000 bbl. The combined capacity of the new stockhouses plus the original 8 circular and 3 interstice silos is 175,000 bbl.

The site chosen for erection of the stockhouses, between the packing house and the mill building, was underlaid with shale, varying from very soft to very hard, making necessary the installation of piles to secure adequate bearing pressures to support the structure and its 100,000 bbl. of cement.

Well drills were used to drill 14-in. diameter holes, varying in depth from 25 to 45 ft. to the point where hard shale was reached. Concrete was poured into these holes and allowed to set, before the foundation slab was placed. Construction started approximately April 1, 1936, and the 836 piles were completed on May 11.

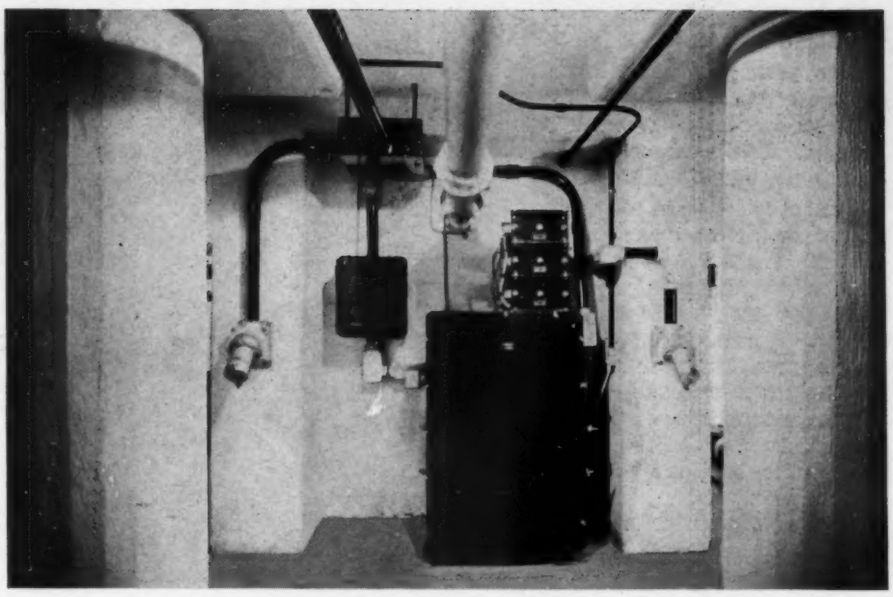


Cement pump mounted on rails, used to discharge cement from any silo

Close-up of new type cement pump, fed from storage by a three-spout system

A 30-in. foundation slab was superimposed upon the piles and reinforced with heavy Carnegie C.B. sections, ranging in weight from 63 to 150 lb. per lineal foot. The basement, which contains the necessary pumping equipment, has a height of 9 ft. Stationary forms were used to the top of the basement, and slip forms were substituted for all concrete pouring above this point.

The stockhouses have 9-in. walls, reinforced with horizontal steel of ½-in. to 1-in. diameter spaced on from 4-in. to 6-in. centers. The job was designed by the company's engineering office in Chicago, and all necessary placing of equipment, driving of piles, etc., were done with local labor. Jones, Hettlesater Construction Co., of Kansas City, Mo., was awarded the contract to erect the structures.



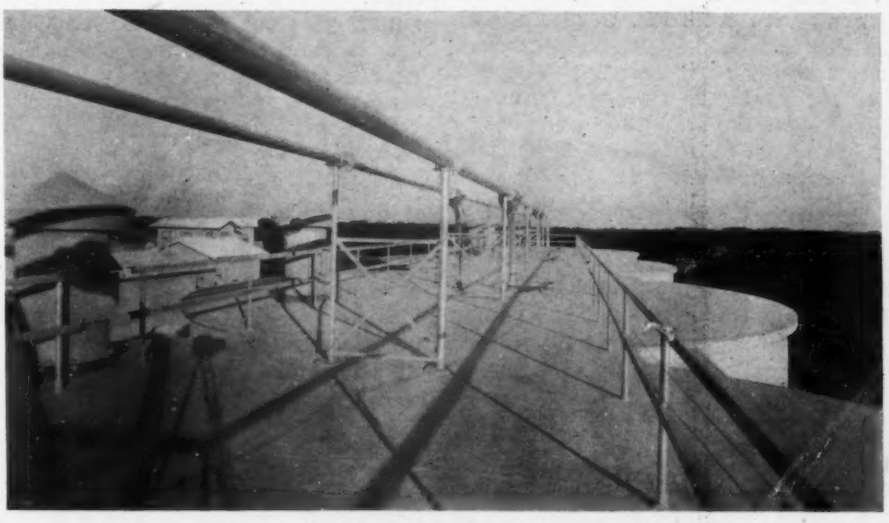
Electrical wall outlets for pump connections, with control cabinet

Cement Handling

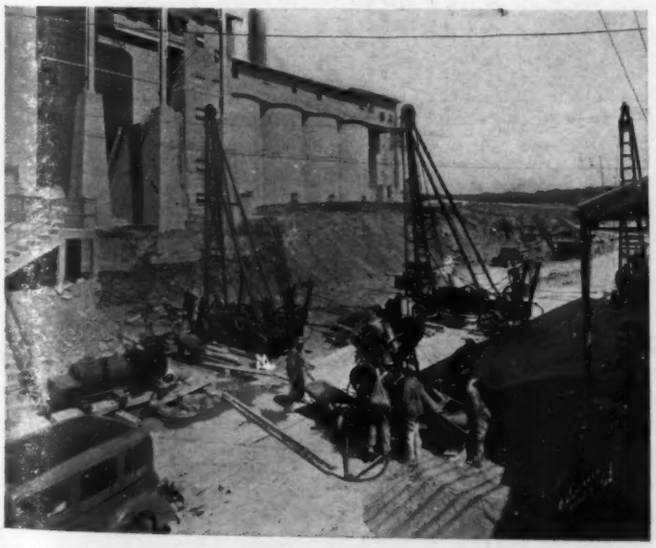
Two 8-in. Fuller-Kinyon lines were placed in the basement underneath the bins proper. Each of these pumps is the new type B, and is capable of delivering 500 bbl. of finished cement per hour. Each pump is driven by a 150-hp. Westinghouse motor, through a direct connection, at 1200 r.p.m., and 35 p.s.i. air pressure is needed for operation. Air is supplied from three Allis-Chalmers air compressors of 1500-cu. ft. displacement.

Each bin is equipped with 6 spouts, 3 for each pump, and each spout has 3 Fuller rotary valves. The pumps are mounted on 29¾-in. gauge rails, and are easily moved from one bin to another.

A 4-in. diameter by 3-ft. section of flexible rubber forms the connection to the air pipe and a flexible 1-ft. length



Cement is conveyed and distributed by air in pipes through the roof of silos



Drilling holes with well drills for concrete "piles" to support stock house foundation

Concrete "piles" were poured to support stock house in dipping shale sub-surface

of 8-in. rubber hose makes the cement discharge connection.

Two pumps are used to reduce the volume of "dead" cement, which would not readily flow to a centrally located pump, and in case of breakdowns of one or the other pump.

Cement is delivered to the new stockhouses, or the other ones, from the finish mill by a 6-in. Fuller-Kinyon pump. The new arrangement is designed for flexibility, to permit the transfer of cement from any one bin to any other in the group or to itself, or to the old stockhouses or direct to the packer bins in the packing house. The pumps are connected up electrically, so that when the packer bins are full they automatically shut off. The stocking of the bins began September 5.

Cement conveying piping arranged for flexible transport

Clinker Grinding

Air separators were installed in both the raw mill and finish mill grinding departments, operating in closed circuit with the mills, to give a high quality product. A 16-ft. Sturtevant separator has been installed to operate in closed circuit with the 8x7x45-ft. Compeb finish mill. The separator is to be driven by a 75-hp. Reliance motor through V-belt drive.

Clinker is introduced to the first compartment (8-ft. diameter) of the 4-compartment mill, and, after passing through the mill, the cement is elevated by bucket elevator to a screw conveyor to the top of the separator. Finished cement passes direct to the 6-in. Fuller-Kinyon pump below to be placed in finish storage. Tailings from the separator pass by gravity to the second compartment of the mill for further grinding, and are re-circulated through the separator.

Raw Grinding

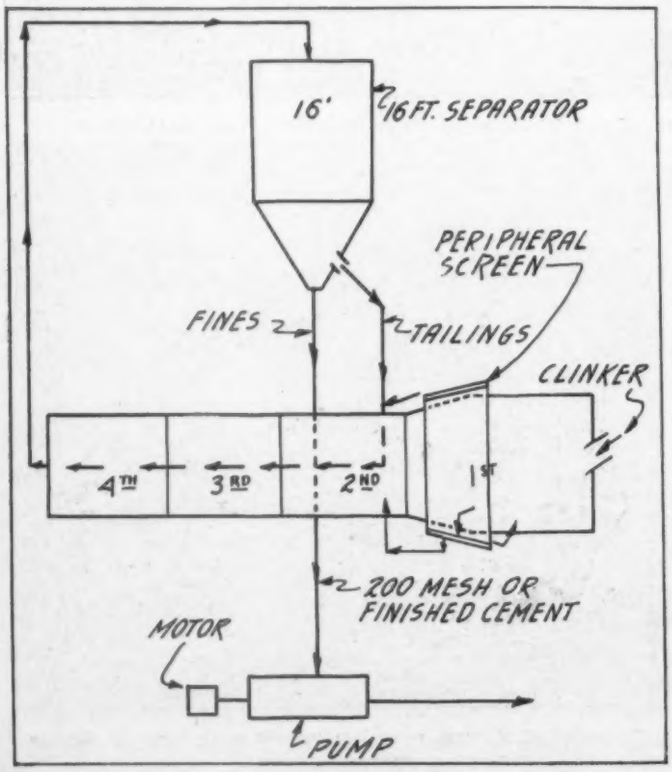
Two identical 14-ft. Sturtevant air separators have been installed to operate in closed circuit with the 8x7x45-ft. Compeb raw mill. The product to be ground in this mill first passes over an Allis-Chalmers double-deck 4-ft. by 8-ft. low-head horizontal type vibrating screen. The upper deck serves to keep the larger, heavier particles from impinging on the lower fines screen. The fines from this screen do not enter the mill, but are elevated direct and split over the two separators.

The oversize passes directly into the first compartment of the mill, and before entering the second compartment it is screened. Oversize from this screen passes directly back to the first compartment, and the throughs are elevated to the separators.

Fines from the separator pass direct to the finish raw material storage, and rejects flow by gravity to No. 2 compartment of the mill to be re-circulated.

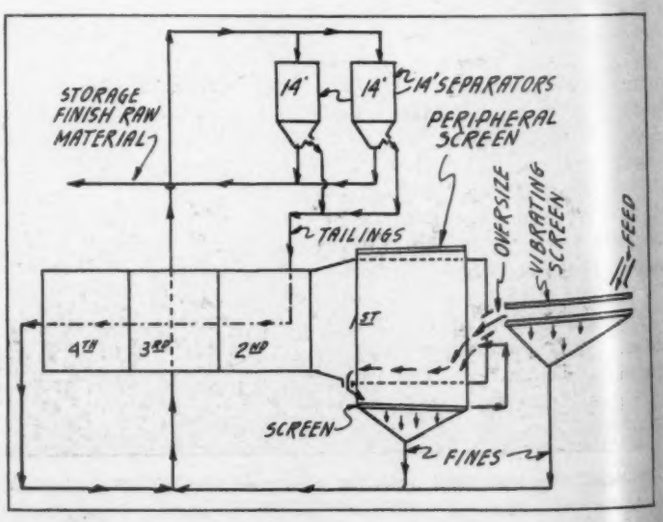
The finish mill separator was installed as a separate unit adjacent to the existing building, next to the finish mill, and the two 14-ft. separators were similarly installed adjacent to the opposite side of the mill building.

The separators are so placed as not to interfere with an overhead crane used for repair and for loading the



LEFT: Diagram of air separator circuit of finish grinding compartment mill

BELOW: Diagram of air separator circuit of raw grinding compartment mill



grinding media to the mills. The raw mill separators are each driven by a 50-hp. Reliance motor through V-belt drives. The finish mill separator was put into operation early in October, and the raw mill separators will be in operation early in November. Each structure will be enclosed with corrugated asbestos-cement siding.

Promotions

RIVERSIDE CEMENT CO., Los Angeles, Calif., announced, effective October 15, the following appointments: Warren H. Leonard, sales manager, promoted to be general manager; John C. Allen, assistant sales manager, to be sales manager; Holton C. Dickson, to be assistant sales manager.

Adds Dust Collector

CALIFORNIA PORTLAND CEMENT CO., Colton, Calif., is reported installing a Norblo dust collector in its finish grinding mill.

Prices Bid—Contracts Let

EL PASO, TEX.: International Boundary Commission let contract for approximately 24,000 bbl. of cement at $50,000, or approximately $2.08 per bbl. to Southwestern Portland Cement Co., El Paso; let contract for 25,000 cu. yd. of gravel to Smelter Sand and Gravel Co. for approximately $40,000, or $1.60 per cu. yd.

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SANDUSKY, OHIO: City Commissioners let contract to Kelley Island Lime and Transport Co., Cleveland, Ohio, for water works lime at $7.93 per ton.

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ROANOKE, ILL.: John Keller & Son, Eureka, Ill., awarded contract for graveling road from Roanoke to Benson at $1.34 per cu. yd. Others bidding were R. A. Cullinan, Tremont, $1.79; John Black, Peoria, $1.88; Elmer Larson, Decatur, $1.43, and the McGrath Sand and Gravel Co., Chillicothe, $1.87.

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WASHINGTON, D. C.: Secretary of the Interior Ickes awarded contracts to Southwestern Portland Cement Co., Victorville, Calif., for 5000 bbl. of cement for Salt River Valley Project, Arizona, at approximately $2.72 per bbl.; to United States Portland Cement Co., Denver, Colo., for 8000 bbl. for Taylor Park Dam, Colorado, at approximately $3.09 per bbl.

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CONCORDIA, KAN.: D. G. Hanson, Logan, Kan., awarded contract for graveling detour on Highway 81 at $1.43 per ton; San Ore Construction Co. bid $1.52.

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NEWARK, OHIO: City awarded contract for 500 tons of chemical quick lime for water works to Marble Cliff Quarries Co., Columbus, Ohio, at $7.90 per ton.

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SPRINGFIELD, ILL.: McGrath Sand and Gravel Co., Lincoln, Ill., low bidder on 9000 tons of crushed gravel for resurfacing West Shore Drive at Lake Springfield at 95c per ton delivered on tracks near Hazel Dell school, or $1.06 at Toronto. Other companies and their bids were: Lincoln Sand & Gravel Co., Lincoln, $1 a ton at Hazel Dell school, and $1.16 a ton at Toronto; Clear Lake Sand & Gravel Co., Springfield, $1.08 at Hazel Dell school, and $1.23 at Toronto; Columbia Quarry Co., St. Louis, $1.18, delivery either Hazel Dell school tracks or Toronto; Lehigh Stone Co., Kankakee, $1.33, delivery at either Hazel Dell or Toronto.

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OKLAHOMA CITY, OKLA.: State Highway Commission bought 632 bbl. of Portland cement for emergency construction at $2.71 per bbl. August 17 the commission rejected all bids for 3600 bbl. when five Oklahoma and two Kansas firms submitted identical $2.71 bids. The Federal Trade Commission has assigned an investigator to study the prices, as a result of the highway commission's complaint.

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APPLETON, WIS.: County highway commissioners awarded contract to Frank Murphy for 700 cu. yd. of crushed gravel at $1.35 per cu. yd. delivered on the highway.

Capital Reduced

WESTERN SAND AND GRAVEL CO., Amarillo, Tex., has reduced its capital stock from $80,000 to $40,000.

Enlarged Plant

CHARLES WARNER, Modesto, Calif., has completed a new sand and gravel plant at Waterford, Calif., of 600 cu. yd. daily capacity. He has operated a smaller plant there for eight years.

New Operation

PAULLINA CEMENT TILE FACTORY, Paullina, Iowa, has opened a new commercial sand and gravel pit 1½ miles south of town.

Plant Reopened

CONSUMERS' CO., Chicago, Ill., reopened its Burlington, Wis., gravel plant about October 1 to supply 30,000 tons of highway gravel.

Builds Another Plant

YAKIMA SAND AND GRAVEL CO., Toppenish, Wash., is erecting a branch plant on Fort Road.

Sand-Lime Brick Production and Shipments

THE following data are compiled from reports received direct from producers of sand-lime brick located in various parts of the United States and Canada. They may be considered representative of the industry.

Ten active sand-lime brick plants reported for the month of September, this number being one less than that reporting for the month of August, statistics for which were published in October.

Average Prices for September

Shipping Point	Plant Price	Delivered Price
Pontiac, Mich.	$11.00	$13.50
Mishawaka, Ind	9.25	....
Syracuse, N. Y.	14.00	16.00-20.00
Saginaw, Mich.	10.50	....
Sioux Falls, S. D.	12.00	....
Watertown, Mass.	12.50	....
Toronto, Ont., Can.	12.00	13.50

Statistics for August and September

	August†	September*
Production	3,920,777	2,915,525
Shipments (rail)	201,000	1,016,584
Shipments (truck)	3,376,859	2,198,792
Stocks on hand	1,939,036	1,835,250
Unfilled orders	1,540,000	1,535,000

† Eleven plants reporting; incomplete, four not reporting unfilled orders.

* Ten plants reporting; incomplete, four not reporting unfilled orders.

Sand-Lime Block

Two producers, in Michigan and Canada, reported production of a total of 69,547 sand-lime block in September, with truck shipments aggregating 78,647. Prices of the block averaged 11c at the plant and 13c delivered, in Canada. The Michigan prices were 12c for 8x8x16 block and 16c for 8x12x16 block, delivered.

Back in the Harness

JOHN L. JACKSON, Saginaw, Mich., writes that he is back with Jackson & Church Co., as treasurer and manager. As dean of the sand-lime brick industry in America, Mr. Jackson says he is going to do all he can to revive that industry, and is looking forward to an annual meeting of the Sand Lime Brick Association in Boston, Mass., some time early next year.

Fire Loss

J. W. BRANNAN SAND AND GRAVEL CO., Denver, Colo., suffered loss by fire of its plant on the Platte river at 31st St. on September 28. Local newspapers quoted F. P. Spratlen, Jr., president of the company, as stating the damage would amount to $50,000.

Bankruptcy Sale

CLINCH MOUNTAIN SILICA SAND CORP., Bristol, Va., real estate and plant was offered for sale at auction, October 29, having been in Federal court bankruptcy proceedings for several years.

Chemists' Corner

RAPID SUB-SIEVE SIZE DETERMINATION OF PULVERIZED MINERALS

By C. E. Heinz
Metallurgist, Joplin, Mo.

ENGINEERS constantly demand more rapid and consistent results for the determination of the percentage of definite sub-sieve sizes in finely pulverized or ground minerals. These data are essential for improving milling operations and products in both wet and dry grinding processes of the metallic and non-metallic mineral industries and in pulverizing coal.

Today there are several ways of calculating or measuring both the grain sizes and the weight percentages of sizes in a pulverized product after it has passed through the No. 200 or No. 325 testing sieve; and a number of excellent devices have been described for this purpose. However, none of these are perfect and the most elaborate calculation, when Stokes's law is used, should be modified by "shape factors" of the grains in the powder. Most of the devices require too much time or expert dexterity for grinding plant control.

In general, the more simple the apparatus, the less complicated the operating technique, the more often data are recorded per unit of time; and the shorter the overall time for recording pertinent data, the greater will be the value of these data for the engineer, providing the data are consistent with plant conditions.

In developing the charts described in this paper, a large sample of Missouri-Oklahoma tripoli was carefully pulverized and mixed for a "standard" in sub-sieve size studies. This mineral, when crushed very fine, exhibits well-rounded grains and rarely tends to elongated or irregular shapes. This "standard" was studied by several private and custom laboratories and by such expert operators using scientific laboratory instruments as the Roller dynamic air analyzer (U.S. Bureau of Mines, New Brunswick, N. J.), and the short column type hydraulic elutriator developed by Cooke (U.S. Bureau of Mines, Rolla, Mo.). The products from the elutriator were carefully checked with a microscope. Sedimentary methods tried included a simple hydrometer system.

Bouyoucos Hydrometer

The data collected in this study indicated some apparatus would give erratic results on repeat tests; but a simple technique was developed for the hydrometer method that would give consistent figures when testing the "standard" over a wide range of temperature constants, from 60 to 90 deg. F. These data indicated the Bouyoucos hydrometer could be used with satisfactory results in a plant processing this mineral.

Pulverized limestone, dolomite, barite and galena were also studied by the hydrometer method, and the data collected indicated this method of determining sub-sieve sizes in these minerals is a satisfactory system when the correct technique is used for each particular mineral and size limits in the grinding problem.

In the hydrometer method there are two distinct steps; the determination of the weight of the solids in suspension and the maximum grain size at a certain depth or time interval, both being calculated from the hydrometer reading. A study of slime densities as reported in the Lowden tables (*Chemical and Metallurgical Engineering*, June, 1912) and by the Heinz nomograph (*Engineering and Mining Journal*, September, 1935) shows the effects of changes in the specific gravity of solids and pulps and the percentage of solids in suspension, the first step in the hydrometer method.

The calculation for the largest grain remaining in suspension under certain conditions is somewhat more complicated, but for plant control work, simple charts have been constructed for powdered minerals dispersed in water, a chart being made for each size grain to be determined. As the Bouyoucos hydrometer scale reads in "grams of solids (Sp. Gr. 2.65) per liter of pulp" in place of the specific gravity of the pulp, these hydrometers are less troublesome to use in plant practice.

Charts for a plant control have been constructed to report grain size in microns, such as 40, 35, 30, 25, 20, 17½, 15, 12½, 10, 7½ and 5 microns. For office study the fourth root of 2 series was followed using the standard No. 200 testing sieve with openings of 74 micron size as the base. These charts were constructed for minerals and plant problems to be solved; and although they may not be perfect, the data recorded by their use give consistent figures, easily checked and conforming to plant practice. These charts are not submitted as perfect working tools for this work, but it is hoped that they will interest other workers in this study and they in turn will report their ideas for speeding up sub-sieve analyses for plant control work.

It is interesting to note the short time interval required for this work by the hydrometer method. For example, a plant grinding silica must make one product with not less than 98% passing the No. 200 sieve and contain not less than 30% by weight of grains smaller than 10 microns in diameter. A 50-gram sample is dispersed in water and the following charts are used: 40, 30, 25 and 20 microns. The figures from these readings, corrected for temperature, when plotted on log-log paper or by a "block method", will tend toward a straight line and indicate the weight percentage of grains less than 20 microns in diameter.

The total elapsed time in this plant, for reporting these data, is less than 10 minutes, and frequently less than 8 minutes are required. When more precise figures are wanted for the sizes smaller than 20 microns, a 100-gram sample is dispersed and charts from 20 microns and finer are used. Hundreds of mill samples have been studied and the weight percentage of the sizes smaller than 10 microns were predicted from the readings of the 20 micron size, in less than 10 minutes and within 2%, plus or minus, of the figures found by the chart for the 10 micron size. Naturally, a special technique has been developed for this special plant problem.

An essential step in the sub-sieve size determination of any pulverized mineral by any method to be used is the thorough dispersion of the mineral powder, so each grain may be free to move independent of the other grains.

Technique Required

The technique of the mechanical analysis of soils by the Bouyoucos hy-

drometer is very well described by Wintermyer, Willis and Thoreen in the U.S. Bureau of Roads monthly *Public Roads* for October, 1931. Thoreen continues the discussion in the August, 1933, issue. Both of these papers contain many valuable suggestions for sub-sieve size analyses and a method for calculating data mechanically. These papers can be bought from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 10c per copy.

The apparatus needed for this work is not costly: a balance or scale to weigh 50 or 100 grams; a mixer such as a "milk-shake" machine or small laboratory flotation cell for dispersing the powder; a watch or electric clock with a full-sweep second hand; two or more Bouyoucos hydrometers and special hydrometer cylinders (jars); thermometers; and, for most minerals, a 3% solution of sodium silicate. The Taylor Instrument Co., Inc., Rochester, N. Y., makes the Bouyoucos hydrometers.

The special nomograph was constructed to correct time factor readings of the Bouyoucos hydrometers when solids are dispersed in water. Two important factors are combined: the specific gravity of the mineral being investigated and the working temperature. A straight line through any points on the two outside scales, indicates on the middle scale the time factor scale to be used on grain size charts. The number found is the percentage of time limits required for the standard conditions; that is, specific gravity of 2.65 and 67 deg. F. It is to be noted on this chart, as the temperature varies from 67 deg. F., 0.2 must be added or subtracted from the hydrometer reading for each degree F. each side of 67.

As the time interval is short, there is no need for elaborate water-baths and temperature controls, if a large supply of water at the working temperature is on hand. When sizes below 10 microns in diameter are to be determined, a water bath should be used or the determination may be made in a modern, air-conditioned room. This nomograph may not be perfect in detail, but the practical results found by its use are most encouraging for plant control work and the tentative size determination of powders of specific gravities other than 2.65. For certain minerals and plant conditions, this nomograph could be reconstructed to give more precise figures that would better suit the conditions.

Chart for One Size Only

Chart No. 2 is for one size only—for those grains having a diameter of 10 microns and smaller—and is an example of how these data are plotted for each grain size to be determined. The diagonal line marked "100" indicates between which time readings the hydrometer will record "standard conditions": for example, solids having a specific gravity of 2.65, and the temperature being 67 deg. F., or equivalents. The oblique lines are drawn as "percentages of standard time" from the standard line marked "100."

Suppose a quartz powder is being examined. If the working temperature increases, the viscosity of the pulp decreases and all individual grains will fall faster; therefore the time for reading the hydrometer will be less as is calculated by the nomograph. Likewise, grains of higher or lower specific gravity than 2.65 will sink faster or slower than quartz, and the time for reading the hydrometer must change as is shown by the nomograph.

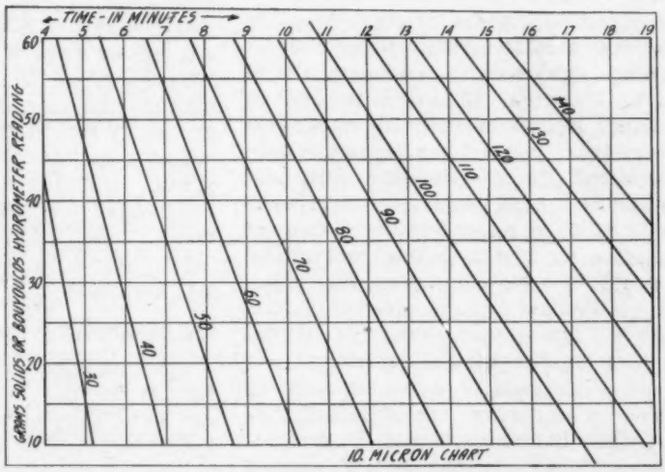
Use of Charts

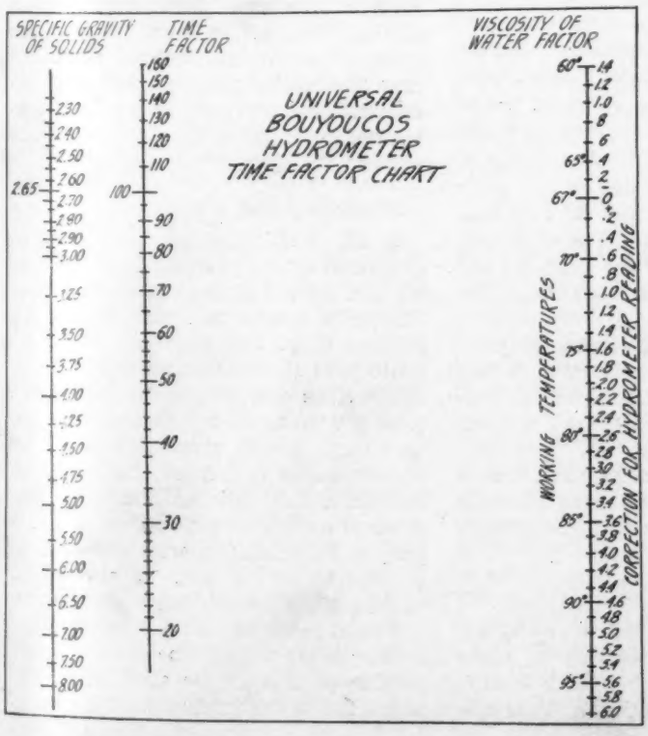
These charts are easy to use. After a pulp is prepared, from unit time or when sedimentation starts, read the hydrometer at the shortest time interval indicated by the oblique line to be used. When the hydrometer reading and the time interval on the oblique line inter-

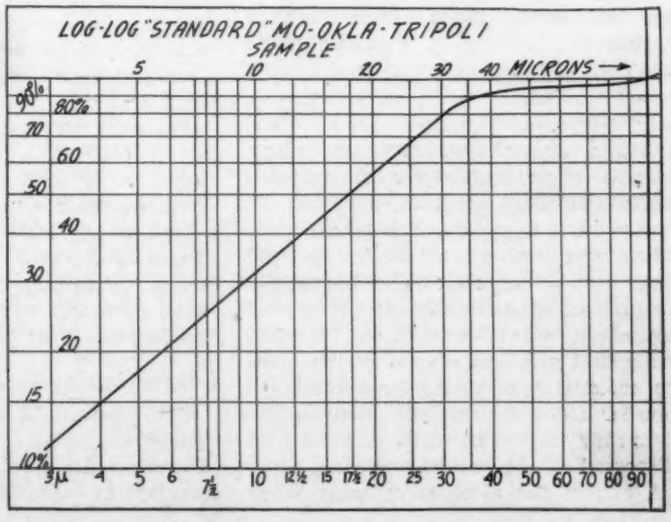
***RIGHT:** Chart 2, made for a specific size of pulverized material*

***LOWER RIGHT:** How readings for a given material look when plotted on log-log paper*

***BELOW:** For obtaining sub-sieve sizes from hydrometer readings*







sect, that reading is noted and corrected for temperature.

The percentage by weight of grains of this size or smaller being determined can be read direct when 100 grams of powder are used, or the hydrometer reading plus the temperature correction times 100 and divided by weight of the powder used is the weight percentage of the size plus smaller grains that still remain in suspension. For example a 50-gram sample of quartz is dispersed in water to make one liter when the temperature is 80 deg. F. The nomograph indicates oblique line "85" is to be used, as a straight line from "2.65" through "80" passes through "85" on the middle line. The chart for 10 microns shows that more than 9 minutes must elapse before the first reading. Suppose that more than 50% by weight of this sample is finer than 10 microns and as 50 grams of powder has been dispersed, the hydrometer must read about 25 grams. Now when the reading is between 30 and 20 grams, locate this number on the chart between 12½ and 13½ minutes. When the hydrometer reading and the oblique line between these two time figures are the same, record the hydrometer reading. Suppose the figure is 27. Add the temperature correction for 80 deg. F., or 2.6, making a total of 29.6. Calculate for weight percentage as follows: 100/50 times 29.6 equals 59.2; or 59.20% of the powder is smaller than 10 microns in diameter. Should 100 grams have been dispersed, the hydrometer reading would have been about 56 or 57 between 9 and 10 minutes from the start of sedimentation, and as the hydrometer cannot be read closer than 0.5 gram, the test would have recorded 58.5, 59.1, or 59.6 grams or percentage of the grains smaller than 10 microns.

It is true that nine variables can be included in precise calculations of sub-sieve size determinations by a hydrometer method, but the simple general technique of the soil testers and the use of these special charts have given very satisfactory results in grinding plant control.

Conclusions

These charts and the nomograph have been constructed for certain minerals and plant conditions. However, it is possible to make charts for minerals having unusual characteristics and for special grinding and sizing operations in unusual plant conditions. A special technique could be worked out for minerals that give odd shaped grains, such as mica, by preparing a "standard" powder for a "yardstick." Some powders may react with water and must be dispersed in some other liquid like light oil, one of the alcohols or some other fluid. Knowing the viscosities of these fluids at the working temperatures, charts can be constructed for the use of hydrometers required to read the specific gravities of these pulps. Should the reader have difficulty in the construction of these charts, the writer may be of some assistance if the problem is explained in detail.

The literature contains much information on the determination of the sub-sieve sizes of powders; and the theory and logic for a sedimentation system of sub-sieve size analyses is well presented by *Oden. "Kolloid-Z"*, 18, 5-45, 1916, and 26, 5-100, 1920, if you like heavy reading; also Doctor Knapp writes very interestingly about a sedimentation apparatus and ways of plotting sub-sieve size data in Vol. 6, No. 1, Analytical Edition, of *Industrial and Engineering Chemistry*, January 15, 1934.

Producers, Engineers, Consumers Confer on Industrial Minerals

Latest Developments in Operation, Processing for Better Products, Described at Pennsylvania Meeting

On September 24, 25 and 26, the Industrial Minerals Division of the American Institute of Mining and Metallurgical Engineers held a joint technical meeting with the Materials and Equipment Division of the American Ceramics Society at State College, Penn. Arrangements for the meeting were made possible by the active participation of the School of Mineral Industries of Pennsylvania State College.

This was the first meeting at which mining engineers, ceramists and consumers of ceramic materials have congregated for the purpose of discussing mutual problems in the technique of production, processing and manufacture. Three technical sessions were held at which 15 papers were presented and discussed.

Limestone Mine Inspected

The three-day meeting opened with a visit to the Bell limestone mine of the American Lime and Stone Co. at Bellefonte, Penn. More than 50 members of the Associations were met at the mine by S. M. Shallcross, general manager, and his staff, and conducted on a tour of inspection through the underground mine and the rotary kiln lime plant on the surface.

The next morning the technical meeting opened with 75 present in a session devoted to the discussion of production problems, under the joint chairmanship of Ross Purdy, secretary, American Ceramic Society and Oliver Bowles, chairman, Industrial Minerals Division, American Institute of Mining and Metallurgical Engineers.

Clay Mining

E. J. Lintner, U. S. Bureau of Mines, Pittsburgh, Penn., presented a paper describing clay-mining methods in different parts of the country and for different types of clay. He also discussed the differences between surface and underground mining.

A paper entitled, "A Modern Ball Clay Operation" by Richard Bell, was read by Clyde Hall, United Clay Mines Corp., in the absence of the author.

Sawing Stone in Place

"The Wire Saw as a Tool for Cutting Slate and Building Stone," presented by Oliver Bowles, briefly reviewed the introduction of the wire saw in the Pennsylvania slate field and discussed recent developments in its use. As now used, the wire saw will cut 3 to 4 sq. ft. per hour in marble, 15 to 20 sq. ft. in slate and up to 50 sq. ft .per hour in limestone. Among other diverse uses for the saw were such operations as cutting footings for dams, sloping the sides of railway and highway cuts, cutting subways, cutting glaciers and accumulations of snow to prevent avalanches, and for cutting circular stone pillars.

Limestone Mine

S. M. Shallcross, general manager, American Lime and Stone Co., presented a paper describing the operations of the Bell mine, which had been visited the previous day. The limestone at Bellefonte is 70 ft. thick and dips 52 deg. at the surface and 80 deg. at the 600 ft. level. The mine is operated by the shrinkage system, in which 60% of the blasted stone is left in the stopes to provide a floor for the miners. Stope stone is drawn through raises to grizzlies in bulldozing chambers, where it is reduced by sledging or blockholing to pass the grizzly to loading chutes in the haulage drifts below. Granby type, 3-cu. yd. cars haul the stone to the loading pockets at the shaft whence it is hoisted to the surface in 6-ton skips

running in balance. Working stopes are carried 260 ft. in length with 40-ft. rib pillars between, and 40-ft. horizontal pillars are left to protect the levels. Mr. Shallcross stated that underground mining produces more fines than surface quarrying, but because of the absence of deleterious materials, a greater percentage of the mine production is marketable.

Stone Sand

A. T. Goldbeck, technical director of National Crushed Stone Association, presented a paper on "Stone Sand." This paper was published by the National Crushed Stone Association as Bulletin No. 10. Mr. Goldbeck described the methods of testing concrete mixtures using stone sand as the fine aggregate. Several lantern slides were presented showing flow sheets of stone sand plants and concrete structures made with the material.

Improving Raw Materials

The afternoon session with over 100 present was devoted to problems of beneficiating raw materials. H. B. Dubois, chairman of the Materials and Equipment Division of the American Ceramic Society and P. M. Tyler, U. S. Bureau of Mines, presided.

The session opened with the presentation of a paper entitled "Raw Material Requirements in the Whiteware and Glass Industries" by E. H. Fritz. The paper pointed out the need for greater uniformity in the non-plastic ingredients as well as in the clays themselves. There is a need for a better method of determining plasticity, greater purity is wanted and processing methods are as yet not all that is desired. There should be more uniformity in particle size and shape. The possibility of using new low temperature fluxes such as nephelin syenite as a substitute for feldspar was mentioned. Other new raw materials were discussed and their possibilities presented.

Limestone Flotation Progress

B. L. Miller, professor of geology, Lehigh University, under the heading of "Limestone Beneficiation," described the flotation process installed by the Valley Forge Cement Co., in preparing cement raw materials. Professor Miller pointed out that flotation was used in this process as a corrective and not for the purpose of eliminating all undesirable ingredients. By its use, the silica content of cement stone could be reduced, free silica could be removed and thereby reduce grinding costs, and carbonates may be separated from quartz and mica. As an example, a feed containing 18% silica alumina and iron had been reduced to 1% or, in other words, the carbonate content had been raised from 82% to 99%. In addition to the Valley Forge Cement Co.'s operation in this country, there is now a new flotation plant operating in Argentina and one in Finland for the beneficiation of cement raw materials. Another installation has been started in South Africa and there are three in the pilot plant stage in France.

M. I. Shaw presented a paper on "Flotation as a Method of Beneficiating Clays" and described his experiments with various flotation methods. Best results were obtained by film flotation by the MacQuisten process. Froth flotation was not satisfactory because some colloidal clay was carried over with the tailing. Subsequent discussion brought out that other experimenters had found that clean elimination of only a small fraction of impurities also removed the plastic quality of the purified clay.

Clays and Gypsum

Technical sessions were resumed on Saturday, under the joint chairmanship of F. C. Flint, president, American Ceramic Society, and J. R. Thoenen, secretary, Industrial Minerals Division, American Institute of Mining and Metallurgical Engineers. Owing to the absence of the author, a paper entitled "Industrial Mineral Education", by C. S. Crouse, professor of mining and metallurgy, University of Kentucky, was read by Mr. Thoenen. Following this, two papers entitled "California Ceramic Materials Other Than Clays," by R. M. Burchfiel, and "The Gypsum Industry of the Grand Rapids, Michigan, District," by A. A. Mathews, were read by title only, since neither author was present and both articles had been published in the September issue of *Mining and Metallurgy*. Mr. Mathew's paper was the winner of a prize offered by the Industrial Minerals Division for the best student paper discussing the mining or milling of any industrial mineral.

Improving Feldspar

V. V. Kelsey, Consolidated Feldspar Corp., presented a paper entitled "Milling and Classification of Feldspar." Mr. Kelsey described the advancement in the process of grinding and preparation of feldspar in order to insure a more uniform chemical content as well as uniformity in burning qualities. Ten years ago, feldspar was customarily ground in chaser mills or buhr stone mills in which the degree of fineness obtained depended upon the skill of the operator. Batch mills, using pebbles, followed and are still used where a high percentage of extremely fine material is required. At present, the pebble mill, with continuous feed and discharge, operating in closed circuit with air separators, is customary practice.

Adequately equipped laboratories were established by producers and are largely responsible for present success. Next came the installation of suitable equipment for the production of granular feldspar for the glass industry. Then following the high intensity magnetic separators to remove impurities. Next, it became necessary to establish a classification which would assure uniform products from different sources. This was worked out by consumers and producers and technicians of the National Bureau of Standards, and resulted in Commercial Standard C.S. 23-30. This defined the particle size and classified various types by chemical composition. Some changes in this classification have followed as needed. At present, six grades are furnished, as follows:

(1) Glass grades
(2) Enamel grades
(3) Whiteware grades
(4) Miscellaneous grades
(5) Glaze grades
(6) High iron grades.

Each of these grades is based on particle size, chemical composition, or both, and/or purpose of use.

Magnetic and Air Separation

"Magnetic Separation" was the title of the next paper, presented by G. W. Jarman, Jr., and S. G. Frantz. Magnetic materials were divided into three groups: Magnetic, para-magnetic and di-electric, according to the degree at which they reacted to magnetic influence. Originally, magnetic separators were simple pulleys used to remove tramp iron from mill feed. Later, improvements and changes in equipment permitted separation of the more feebly reactive para-magnetics, and recently equipment has been developed to separate even materials which are repelled by a magnet. This presentation was highly technical and will be later published by the American Ceramic Society, to which the reader is referred for details.

In the absence of the author, Mr. Jarman presented Mr. Slaymaker's paper on "Air Separation of Minerals." Owing to lack of time, presentation of this paper was reduced to a minimum and Mr. Jarman proceeded rapidly through the development of the air separator from the crude Arizona dry washer of the early gold prospector to the present machine. Numerous lantern slides were shown illustrating the presentation.

Following the technical sessions a demonstration of the new type of magnetic separator was given in the laboratory of the School of Mineral Industries.

HINTS AND HELPS FOR SUPERINTENDENTS

Economical Stockpiling

By R. J. Hale,
Dreyer Sand Co., Turner, Kan.

THE IDEA in the attached drawing is to be able to stock pile sand and take care of the loading bin at the same time. The loading bin holds about 20 cu. yd. of sand.

Our dragline runs continuously when our dredge is in operation. When the loading bin is filled, the drag keeps on pulling sand over the bin into our stock pile until the stock pile is filled—at about 5000 cu. yd., which is what we consider enough to last through winter.

It is very easy for us to load out of our stock pile: we just reverse the bucket and cables and fill the bin from stock pile. The man running the hoist can easily see the operation of the entire plant from hoist house. He also attends to the office and weighs trucks and makes out tickets—duties which require a very short time.

Our loading bins have what we call wings (which are not shown in the drawing). The wings extend out from each end of the loading bin about 30 ft. on a 20-deg. angle, to keep sand from spilling around the ends of the loading bin and getting in the roadway. Our bins extend the full width of our sand run, so as to enable trucks to drive under one bin and back under the other.

Truck on turntable, ready to unload into hopper

Our fine sand is handled the same way as our coarse. Everything is in a straight line, so that we are able to do all our loading and stockpiling without changing a cable sheave and thus save a lot of time. We operate our whole plant with three men.

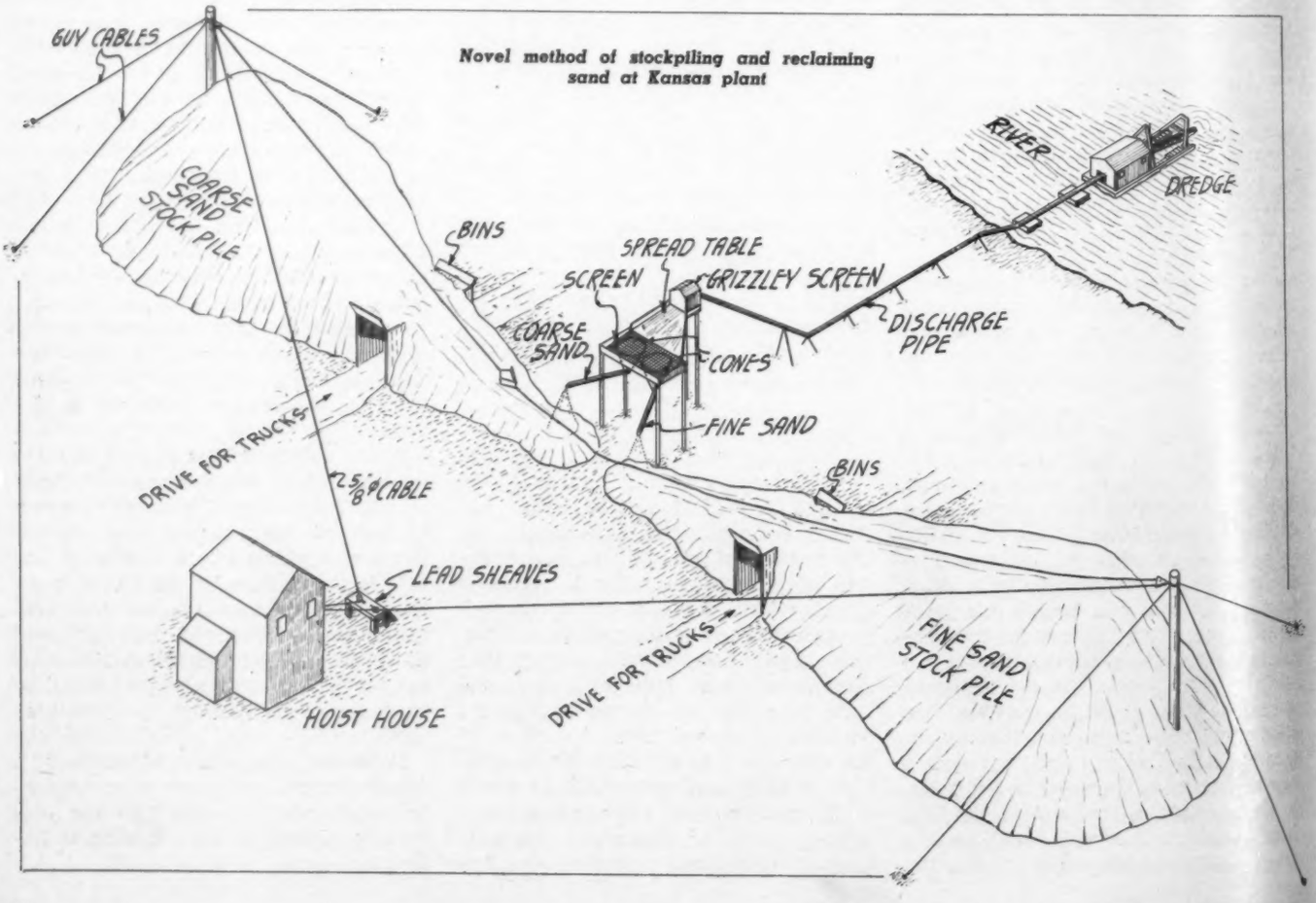
We use a Sterling hoist, direct-connected through a small pinion gear to a Model A Ford motor, which has given us wonderful service for three years and very little expense. Our loading bins are 10x10x20 ft. inside.

Truck Turntable

USE FOR an old Erie crane chassis has been found at the Pixley, Mo., crushed stone plant of the Stewart Sand and Material Co., Kansas City,

The table is turned, and truck may dump into railroad car

Novel method of stockpiling and reclaiming sand at Kansas plant



Mo. As in many plants, no provision was made for handling riprap or other odd sizes of stone for railway shipment, because of the infrequency of demand.

To provide for truck loading of railway cars the device illustrated was improvised. An old Erie revolving crane chassis was set up on four concrete posts and anchored there. On this was built an ordinary turntable substantial enough to carry a truck loaded with stone. A ramp leads to this platform. The trucks from the quarry or mine may thus dump directly into railway cars, or into the hopper shown, which can be used to load other trucks.

Power for operating the revolving mechanism of the crane chassis is supplied by an electric motor and a chain drive.

Skip Bodies Economical

CALDWELL STONE CO., has increased its production of crushed stone a third at its Danville, Ky., plant since its method of handling rock from the quarry to the crusher was changed late in 1935. Six 1¼-yd. steel buckets, manufactured by the Lambert Automatic Skip Co., are used with two Ford V-8 trucks equipped with special Lambert hoisting and unloading attachment, in place of the truck to crusher method previously used.

The skip buckets are set wherever the stone is to be taken from in the quarry, are picked up by the trucks when filled, and returned to the working face to be refilled. The trucks with the loaded buckets are backed up to the primary crushers, and the buckets are "tipped over" by a controller at the driver's seat. It is not necessary for the driver to leave his seat at any time.

Truck driver at his seat controls tipping of skips into primary crushers

The men in the quarry merely hook the loaded buckets to the truck hoist, and a control at the driver's seat operates the hoisting mechanism.

The use of the bucket-truck arrangement permits great flexibility in the quarry operation of a plant of this size. Buckets can be stationed at points in the quarry where the best rock is located. A clean quarry floor is maintained at all times, by hauling out skip loads of waste from time to time as it accumulates.

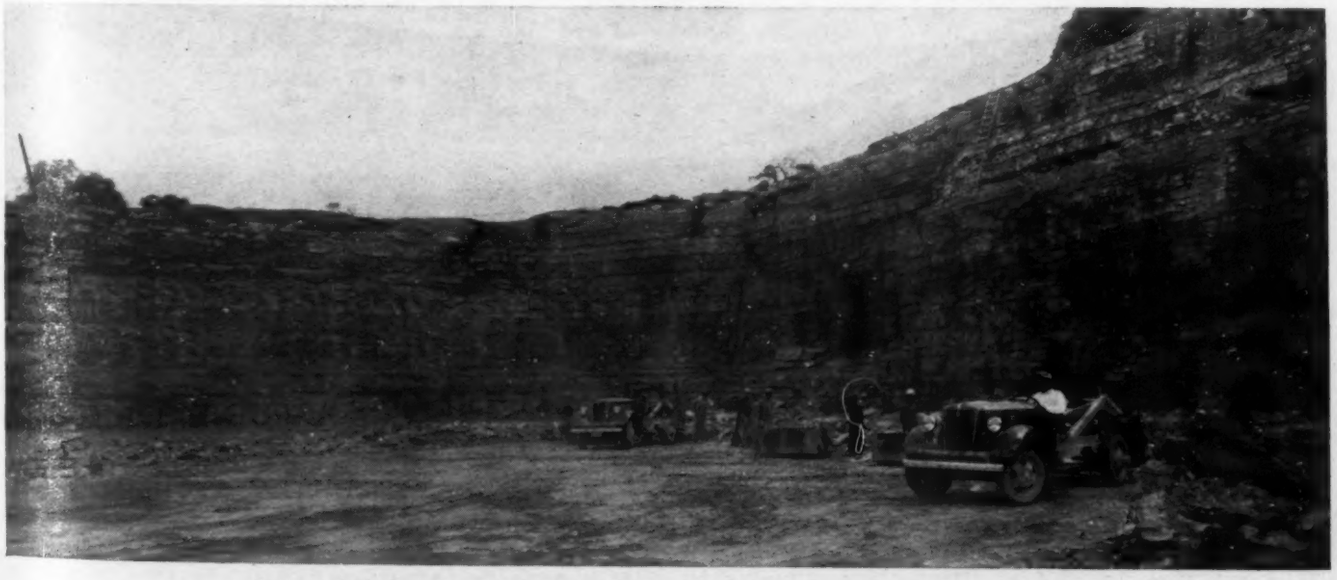
Piece-Work Quarry Labor

The quarry crew are on a piece-work basis. Two men are assigned to each skip bucket, and are paid at the rate of 6 cents per bucket, working in two 5-hr. shifts. The men at the crusher are similarly paid, depending upon the number of skip-loads handled. Each time the truck driver leaves the quarry, he is handed a metal tag by the loader.

The trucks at this writing are hauling about 400-ft. from the quarry to the crushing plant. The expense of quarrying has been cut down considerably and there has been a minimum of delay in getting rock to the crushers, according to company officials.

The maximum size rock loaded is of a size easily handled by the men in the quarry. Rock is fed to two jaw crushers set side by side—a 15x24-in. Universal crusher and a 16x20-in. Climax crusher. The tops of the crushers are set flush with the ground level to permit easy unloading of the rock into them.

The crushed rock, from 2½-in. down, is carried by an 18-in. belt, conveyor, 125 ft. c. to c., across a creek to the screening plant, where it passes over a 42-in.x8-ft. rotary screen. Oversize is passed to a No. 8 Traylor gyratory crusher, reduced to the equivalent of a No. 6 by special concaves. Sizing is done over a 3x8-ft. double-deck Niagara screen, and the finished rock is stored in 6 bins having a total capacity of 200 tons.



Trucks at Caldwell Stone Co., Danville, Ky., quarry picking up loaded skip buckets

Recent Quotations on Rock Products Securities

Stock	Date	Bid	Asked	Dividends	
Allentown P. C., com.[47]	10-21-36	4	5		
Allentown P. C., pfd.[47]	10-21-36	6	8		
Alpha P. C., com.	10-23-36	29¾	31	.25 (qu.)	Oct. 24
American Aggregates, 1st mtg. 3/6's, 1943, new bonds[48]	10-16-36	50	..		
American Aggregates, 6's, 1943, old[48]	10-16-36	50	..		
American Aggregates, com.[48]	10-16-36	1	2		
American Aggregates, pfd.[48]	10-16-36	4	..		
Arundel Corp., com.	10-23-36	18⅞	actual sale		
Ash Grove L. & P. C., com.[47]	10-21-36	14	15		
Ash Grove L. & P. C., pfd.[47]	10-21-36	97	100		
Bessemer L. & C., cert. of dep., 1947[46]	10-16-36	110	112		
Bessemer L. & C., com.[47]	10-21-36	10	11		
Bessemer L. & C., pfd.[47]	10-21-36	33	35		
Bessemer L. & C., 6's, 1955[47]	10-28-36	89	90		
Bessemer L. & C., 1st 6½'s, 1947[48]	10-16-36	90	..		
Boston S. & G., com.[37]	10-16-36	1	2		
Boston S. & G. 7% pfd.[37]	10-16-36	8	10		
Boston S. & G., 7's, 1930[37]	10-16-36	70	..		
Calaveras Cement, com.[49]	10-23-36	6¼	6¾		
Calaveras Cement, 7% pfd.[49]	10-16-36	94	97	1.00	Nov. 1
California Art Tile, A[9]	10-16-36	18¼	19		
California Art Tile, B[9]	10-16-36	2½	3½		
Canada Cement, com.[43]	10-16-36	5⅝	8⅞		
Canada Cement, pfd.[43]	10-16-36	89¼	90		
Canada Cement, 5½'s, 1947[43]	10-16-36	104½	..		
Canada Cement, 4¼'s, 1951[43]	10-16-36	102	102½		
Consol. Cement, 1st 6's, 1950[50]	10-27-36	84	86		
Consol. Cement, A[50]	10-27-36	8¼	9		
Consol. Okla. S. & G., 6½'s, 1948[42]	10-16-36	12	..		
Consol. S. & G., pfd.[42]	10-16-36	36	..		
Consol. Rock Products, units[47]	10-21-36	90c	1		
Construction Mat., com.[47]	10-21-36	20c	30c		
Construction Mat., pfd.[47]	10-21-36	1	1¼		
Consumers Rock & Gravel, 1st mtg. 6½'s, 1948[47]	10-21-36	30	32		
Coosa P. C., 1st 6's[47]	10-21-36	35	40		
Coplay Cement Mfg., pfd.[47]	10-21-36	15	16		
Coplay Cement Mfg., 6's, 1941[47]	10-21-36	97	100		
Cumberland P. C., 7's, 1937[47]	10-21-36	97	100		
Cumberland P. C., pfd.	10-28-36	43	45		
Dewey P. C., com.[47]	10-21-36	50	55		
Dolese & Shepard[47]	10-28-36	37	39		
Dufferin Pav. & Cr. Stone, 5%, Series "A" deb., 1955[42]	10-16-36	67	..		
Federal P. C., 6½'s, 1941[47]	10-21-36	52	55		
Fla. P. C., units[47]	10-21-36	35	37		
Fla. P. C., 6½'s, 1937[46]	10-16-36	101	102		
Giant P. C., com.[50]	10-27-36	7¼	8¼		
Giant P. C., pfd.[50]	10-27-36	28¼	29¼		
Gyp., Lime & Alabastine, Ltd.	10-23-36	13	actual sale		
Gyp., Lime & Alabastine, 5½'s, 1948[47]	10-21-36	100	102		
Hawkeye P. C., cap.[47]	10-21-36	32	35		
Hercules Cement, com.[47]	10-21-36	37	40		
Hercules Cement, pfd.[47]	10-21-36	93	96		
Hermitage Cement, com.[47]	10-21-36	16	18		
Hermitage Cement, pfd[47]	10-21-36	105	106		
Ideal Cement, com.[50]	10-27-36	84	86		
International Cement, conv. deb. 4's, 1945	10-22-36	163¼	actual sale		
Kelley Island L. & T.	10-22-36	26¼	actual sale		
Ky. Cons. Stone, 6½'s, 1938[47]	10-21-36	20	22		
Ky. Cons. Stone, com.[47]	10-21-36	1	2		
Ky. Cons. Stone, pfd.[47]	10-21-36	3	5		
Ky. Cons. Stone, 1st mtg., 6½'s[46]	10-16-36	16	18		
Ky. Rock Asphalt, 6½'s, 1936[47]	10-21-36	28	30		
Lawrence P. C., com.	10-24-36	33½	35½		
Lawrence P. C., 5½'s, 1942[50]	10-27-36	100½	..		
Lehigh P. C., com.	10-23-36	38¼	39	.25 (qu.) Nov. 2 .50 (ex.) Nov. 2	
Lehigh P. C., 4% pfd[47]	10-28-36	152	155		
Lone Star Cement, com[47]	10-28-36	57	58		
Louisville Cement[47]	10-21-36	100	105		
Lyman-Richey, 1st 6's, 1935[50]	10-27-36	50	..		
Marbelite Corp., com[46]	10-16-36	40c	60c		
Marbelite Corp., pfd.[46]	10-16-36	4¼	4¾		
Marblehead Lime, 7's, 1944[34]	10-16-36	95	100		
Marquette Cement, com.[50]	10-27-36	39	41		
Marquette Cement, pfd.[50]	10-27-36	98½	..		
Material Service Corp.[47]	10-21-36	8	9		
McCrady-Rodgers, com.[47]	10-21-36	7	8		
McCrady-Rodgers, 7% pfd.[47]	10-21-36	33	36		
Medusa P. C., com.	10-23-36	34½	36		
Medusa P. C., pfd.[47]	10-21-36	60	65		
Michigan L. and C., com.[47]	10-21-36	43	45		
Minnesota Mining & Mfg. Co.	10-22-36	39½	actual sale		
Missouri P. C.	10-23-36	17⅝	actual sale	.25	Oct. 31
Monarch Cement, com.[47]	10-21-36	98	100		
Monolith P. C., com.[9]	10-16-36	3	3½		
Monolith P. C., 8% pfd.[9]	10-16-36	6¾	7¼		
Monolith, P. C., units[9]	10-16-36	16½	18		
Monolith P. C., 1st mtg.[9]	10-16-36	104	105		
Monolith Portland Midwest, pfd.[9]	10-16-36	2¼	2½		
National Gypsum, A, com.[47]	10-21-36	51	52		
National Gypsum, 1st pfd.[47]	10-21-36	103	104		
National Gypsum, 2nd pfd.[47]	10-21-36	18	19		
National L. & S., 6½'s, 1941[47]	10-21-36	97	100		
Nazareth Cement, com.[47]	10-21-36	7	8		
Nazareth Cement, pfd.[47]	10-21-36	60	65		
Newaygo P. C., 7% cum. pfd.[47]	10-21-36	80	85		
New England Lime, units[14]	10-16-36	15	20		
N. Y. Trap Rock, 1st 6's, 1946	10-23-36	89½	90		
N. Y. Trap Rock, 6's, stamped, 1946	10-23-36	90¼	91½		
N. Y. Trap Rock, 7% pfd.[46]	10-16-36	60	65		
North Amer. Cement, 1st 6½'s, 1953[50]	10-27-36	49	51		
North Amer. Cement, 6½'s, 1943[50]	10-27-36	95½	97½		
North Amer. Cement, 6½'s, 1940[50]	10-27-36	72	76		
North Amer. Cement, "A" pfd.	10-20-36	4¼	6		
North American Cement "B"[47]	10-21-36	5	6		
North Shore Mat. 1st 6's[47]	10-21-36	35	40		
Northwestern P. C., units[9]	10-16-36	55	60		
Northwestern States P. C.[47]	10-21-36	22	24	.40	Oct. 1
Ohio River S. & G., com[47]	10-28-36	1	2		
Ohio River S. & G. 1st pfd[47]	10-28-36	63	66		
Ohio River S. & G., 2nd pfd[47]	10-28-36	5	6		
Ohio River S. & G., 6's[46]	10-16-36	..	12		
Oregon P. C., com.[47]	10-21-36	4	5		
Oregon P. C., pfd.[47]	10-21-36	96	98		
Oregon P. C., conv. pfd.[47]	10-21-36	50	55		
Pacific Coast Agg., new com.[46]	10-16-36	3⅛	3¼		
Pacific P. C., com.[46]	10-16-36	4½	5¼		
Pacific P. C., pfd.[46]	10-16-36	50	52		
Peerless Cement, com[50]	10-27-36	4½	4⅞		
Penn.-Dixie Cement, com.	10-23-36	7⅛	7⅝		
Penn.-Dixie Cement, pfd.	10-23-36	52⅞	55⅛		
Penn.-Dixie Cement, 6's, A, 1941	10-23-36	96⅛	99		
Penn. Glass Sand Corp., com.[47]	10-28-36	20	21		
Penn. Glass Sand Corp., pfd.[47]	10-28-36	120	125		
Penn. Glass Sand Corp., 1st Mtg. 4½'s, 1960	10-23-36	103½	105		
Petoskey P. C., 6's, 1935-38[48]	10-16-36	98	..		
Petoskey P. C., 6's, 1941[48]	10-16-36	94	..		
Petoskey P. C., com.[48]	10-16-36	7	8		
Republic P. C., 6's, 1943[50]	10-27-36	103	..		
Riverside Cement, A[9]	10-16-36	15	15¾		
Riverside Cement, B[9]	10-16-36	1	1½		
Riverside Cement, pfd.[9]	10-16-36	102	105	1.50 (qu.)	Nov. 2
Rockland & Rockport Lime, 1st pfd.[47]	10-21-36	5	7		
Santa Cruz P. C., pfd.[9]	10-16-36	45	50		
Schumacher Wallboard, com.[9]	10-16-36	4⅜	5½		
Schumacher Wallboard, pfd.[9]	10-16-36	18	20		
Signal Mt. P. C., units[50]	10-27-36	58	..		
Southwestern P. C., units[50]	10-16-36	200	..		
Spokane P. C., units[47]	10-21-36	12	15		
Standard Pav. & Mat. (Can.), com.[43]	10-16-36	3⅛	3¼		
Standard Pav. & Mat., pfd.[43]	10-16-36	20	23		
Superior P. C., A[40]	10-16-36	42½	43½	.27½	Nov. 2
Superior P. C., B[40]	10-16-36	12	14		
Trinity P. C., units[47]	10-19-36	40	..		
U. S. Gypsum, com	10-23-36	103	104¼		
U. S. Gypsum, 7% pfd.	10-23-36	166	168		
Volunteer P. C., 1st 7's, 1942[47]	10-21-36	98	100		
Volunteer P. C., units[47]	10-21-36	5	6		
Vulcanite P. C., com.[47]	10-21-36	6	8		
Vulcanite P. C., 7½'s, 1943[47]	10-21-36	98	100		
Wabash P. C.[47]	10-21-36	10	11		
Warner Co., ww, 1st 6's, 1944[47]	10-21-36	82	83		
Warner Co., com.[47]	10-21-36	6	7		
Warner Co., pfd.[47]	10-21-36	15	16		
Whitehall Cement Mfg. com.[47]	10-21-36	52	55		
Whitehall Cement Mfg., pfd.[47]	10-21-36	48	50		
Wisconsin L & C., 1st 7's, 1940[47]	10-21-36	85	90		
Wolverine P. C., com.[47]	10-21-36	7	8		
Yosemite P. C., A com.[40]	10-16-36	5½	6		

Quotations by: [9]A. E. White Co., San Francisco, Calif. [14]The Securities Co. of Milwaukee, Inc., Milwaukee, Wis. [37]Wise, Hobbs & Seaver, Inc., Boston. [40]Martin Judge, Jr., and Co., San Francisco, Calif. [42]Nesbitt, Thomson & Co., Toronto. [46]First National Bank of Chicago, Chicago, Ill. [47]Anderson Plots and Co., Chicago, Ill. [48]Hewitt, Ladin & Co., New York, N. Y. [50]Rogers & Tracy, Inc., Chicago, Ill.

Recent Dividends Announced

Calaveras Cement, pfd. (This leaves arrears of $11.25.)	$1.00	Nov. 1, 1936
Certain-teed Products, 6% pfd. (init.)	1.50	Oct. 1, 1936
Lehigh P.C., com. (quar.)	.25	Nov. 2, 1936
(extra)	.50	Nov. 2, 1936
Northwestern States P. C.	.40	Oct. 1, 1936
Riverside Cement, $6 pfd. (quar.)	1.50	Nov. 2, 1936
Superior P. C., A. (This leaves arrears of $2.75.)	.27½	Nov. 2, 1933

PENNSYLVANIA-DIXIE CEMENT CORP., New York City, and subsidiaries report for the 12 months ended September 30, profit of $1,793,485 before depreciation, depletion, interest and federal income taxes, against profit of $1,083,930 for the 12 months ended September 30, 1935. After provision for depreciation, depletion, interest and federal income taxes, there was a net loss of $263,777, against net loss of $803,242 in the preceding 12 months. Current assets as of September 30, amounted to $5,104,985, and current liabilities were $481,562, against $4,179,833 and $245,557, respectively, on September 30, 1935.

CONSOLIDATED EARNINGS STATEMENT
(12 months to September 30)

	1936	1935
Operating profit	$1,793,485	$1,083,930
Depreciation and depletion	1,371,249	1,369,795
Profit	422,236	(d)285,865
Interest	517,242	544,387
Federal income tax	168,771	.....
Net loss	263,777	830,242

Federal income tax is listed because the depreciation and depletion charge-off is greater than the government allows.

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UNITED STATES GYPSUM CO., Chicago, Ill., and subsidiaries, report a net income for the three months ended September 30 of $1,947,627 after surtaxes, equal after preferred dividends to $1.52 a share on 1,192,103 shares of common stock outstanding. This compares with $1,261,458, or 94c a share on common stock in the like 1935 period.

For the nine months ended September 30, net income was $4,189,401, equal to $3.17 a share on common stock, against $2,888,935 or $2.08 a common share in the corresponding months of 1935.

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LEHIGH PORTLAND CEMENT CO., Allentown, Penn., reports for the 12 months ended September 30, 1936, a net profit of $2,207,863 after depreciation, depletion, obsolescence and normal federal income taxes based on the new capital setup. The above net profit is equal after allowing for 12 months' dividend requirements on 121,467 shares (par $100) of 4% preferred to $3.47 a share on 495,628 shares(par $25) of common stock. No provision has been made for federal surtaxes on undistributed profits.

This compares with net profit for the 12 months ended September 30, 1935, of $265,812, equal to $2.18 a share (par $100) on the 121,467 shares of 4% preferred now outstanding.

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ALPHA PORTLAND CEMENT CO., Easton, Penn., reports for the 12 months ended September 30, 1936, a net profit of $645,646 after estimated federal income taxes, depreciation, depletion, minority interest, etc., but exclusive of $93,561 loss on sale of investments, which was charged to surplus account, equal to $1 a share on 644,600 common shares. No provision has been made for federal surtaxes on undistributed profits. This compares with net loss of $269,181 in the 12 months ended September 30, 1935.

The above statement includes operations of Alpha Sand Co., a former subsidiary of Alpha Portland Cement Co., to March 31, 1936, as the company disposed of its interests therein on April 24, 1936.

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GIANT PORTLAND CEMENT CO., Egypt, Penn., has called a special stockholders' meeting for November 16 to act on a plan of financial reorganization. Charles F. Conn, president, in a letter to shareholders announced that the chief reason for bringing forward the plan is to eliminate an operating deficit of $98,314 in the earned surplus account and make dividends possible.

"After five consecutive years of operating losses a profit seems likely for the current year," he said. "Under the law no dividends may be paid if impairment of capital already exists or results therefrom.

"An operating deficit as of June 30, 1936, precludes any distribution of earnings until the deficit is provided for. Any undistributed earnings for the current year are subject to a graduated Federal tax up to 27%."

Besides eliminating the operating deficit, the plan provides for reduction of book value of good will from $1,177,895 to $1; erasure of accumulated unpaid dividends amounting to $19.25 a share on present preferred stock; retirement of treasury stock and reduction of capital from $2,731,100 to $1,132,000, largely bookkeeping changes.

Under the plan, shareholders are asked to authorize an issue of $75,000 shares of $2.50 cumulative convertible preferred stock (par $20), redeemable on call or in liquidation at $51.25 per share and convertible at option of the holder into two shares of new common and creation of 250,000 shares of $10 par common stock.

Under the new setup, outstanding preferred will consist of $45,568 shares, par $20, against present 32,548 shares, par $50.

Preferred stockholders are to be given the right to exchange each present share for 1.4 shares of new preferred, while the 22,074 new common will be exchanged on a share for share basis.

The plan involves no underwriting or commission expense, it adds.

Earnings Statement	6 mos. to June 30,'36	Year to Dec. 31,'35
Cement sales (bbls.)	$249,010	$443,840
Operating profit	27,391	40,276
Depreciation	16,600	87,525
Net profit	10,791	(d)47,249

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LONE STAR CEMENT CORP., New York City (formerly International Cement Corp.), and subsidiaries report for quarter ended September 30, subject to year-end adjustments, a net profit of $836,049 after depreciation, interest, reserve for federal income taxes and contingencies, etc., equivalent to $1.06 a share on 789,755 no par shares of capital stock. No provision is made for federal surtax on undistributed profits.

This compares with $746,981 or $1.10 a share on 678,791 shares in preceding quarter and $299,707 or 48c a share on 626,278 shares in September quarter of previous year.

For nine months ended September 30, the net profit was $2,051,335 after charges and taxes, equal to $2.60 a share on 798,755 shares, comparing with $754,728 or $1.20 a share on 626,278 shares in first nine months of 1935.

The increase of 163,477 shares outstanding represents issuance due to the conversion of $5,726,000 principal amount of ten-year 4% convertible debentures converted during first nine months of 1936, leaving outstanding at September 30, last, $6,274,000 principal amount of debentures. Since that date additional conversions have been made so that at October 20, 1936, the total conversions aggregated $6,638,000 principal amount of debentures leaving then outstanding $5,362,000 principal amount.

Income account for quarters, ended September 30, were:

	1936	1935
Net sales	$5,120,642	$3,922,619
Costs, expenses and depreciation	3,892,666	3,275,571
Profit	$1,227,975	$ 647,048
Interest, amortization, etc.	71,018	219,762
Federal income tax and contingent reserve	320,909	127,579
Net profit	$ 836,049	$ 299,707

Nine months ended September 30:

	1936	1935
Net sales	$13,527,348	$10,572,347
Costs, expenses and depreciation	10,451,464	8,759,046
Profit	$ 3,075,884	$ 1,813,301
Interest, etc.	274,593	661,379
Federal income tax and contingent reserve	749,956	397,194
Net profit	$ 2,051,335	$ 754,728

Lime Producers' Forum

Conducted by Victor J. Azbe,

Consulting Engineer, St. Louis, Mo.

Peculiarities of Rotary Kilns

While the rotary lime kiln is widely used, its basic operating factors are little understood, and because of this, one finds frequently monstrously large kilns installed at great expense that, due to the additional high operating costs, give a product relatively too costly for an intensely competitive market.

A thorough understanding of fundamental matters may possibly bear immediate fruit in increased capacity, reduced fuel consumption, lengthening of operating periods, and possible improvement of the product. This would reduce both capital and operating charges per unit of output possible to such an extent that in part the disadvantages under which the rotary kiln labors may be overcome by possible advantages to which, under proper conditions, it may be subject.

Success in this field is dependent upon an understanding of certain phases of fuel engineering, as cheapness of product is all a matter of proper heat application, and the latter may be of all degrees, depending upon operating conditions, upon operating equipment, but mainly upon proficiency of the operators and of the operating superintendent.

Unfortunately a rotary lime kiln operates upon an entirely different principle, to its disadvantage, from that of a vertical kiln. In the vertical kiln the heat transfer is mainly by convection; that is, direct contact of gas with the stone or lime surface. In the rotary lime kiln heat transfer is mainly by radiation from the flame and from the heated walls. In the rotary kiln there is little penetration of hot products of combustion below the upper lime layer; in fact, the gas flow is actually outward due to the evolution of CO_2 gas.

Stratification of Kiln Gases

There are, so to say, two streams of gas in the rotary—the upper hot stream and the lower cool stream, and after the initial turbulent stage there is little intermingling between the two streams. The cool stream flows placidly along the stone surface; the hot, much faster, stream along the upper kiln portion. That this is so is proven by gas analysis at the kiln end; the lower stream contains considerably more CO_2 brought from far back in the hot zone. If intermingling were rapid, this stratification would not exist, both the upper and lower streams would contain the same CO_2 percentage and would be of the same temperature.

We may say that the surface available to convection heat transfer is only the upper surface of the limestone or lime layer in the bottom of the kiln. Due to projections of the edges of pieces from the measured surface, the actual surface exposed to view and active as a heat absorber may possibly be equal to 2 or 3 times the measured surface, and in a kiln 175 ft. long and 9 ft. in diameter that may be about 2000 sq. ft., which is an insignificant amount compared with the amount of heat to be transferred.

As stated, a rotary lime kiln is inclined to stratify the gas after the first 50 ft. from the gas inlet end, and even in the hot zone the turbulency so necessary for high rates of heat transfer by convection is comparatively slight, and so it is quite doubtful if the heat transfer rate by convection is greater than 5 B.t.u. per sq. ft. per hour per degree difference in temperature.

How Heat is Transferred

The average temperature of the stone and lime in the kiln varies from 75 to 2500 deg. F. on the surface of the layer with a probable average of 1300 deg. F. The gas temperature along the stone or lime surface ranges from 2800 deg. in hot zone to 1100 deg. at the outlet. The mean temperature difference, therefore, is about 1000 deg. F. with a likelihood of less rather than more. In consequence heat transferred by convection in one hour is about 10,000,000 B.t.u. If the kiln makes 150 tons of lime per day, the amount of heat to be transferred per hour is 25,000,000 B.t.u., and so the convection portion given directly to the lime is considerably less than half. While some heat is transferred by the hot lining surface when passing under the kiln charge, this amount necessarily must be small.

Increasing heat transferred by convection evidently requires a greater surface to work on, which means a heavier charge in the kiln, or a higher average temperature of the gas to increase the temperature difference, or a greater rotation to bring cooled particles to the surface and submerge the heated ones; which also tends to increase temperature difference, and so the rate of heat absorption.

It takes time for heat to penetrate through the lump; the surface of a piece of lime with core may be at the temperature of the flame, which heat is only gradually penetrating through the insulating lime layer to the core; only as gradually can this piece be absorbing heat. It is best to bury it to give it time to equalize its temperature, and in the mean time bring others to the surface that are capable of taking on heat at a more rapid rate due to their cooler outer film.

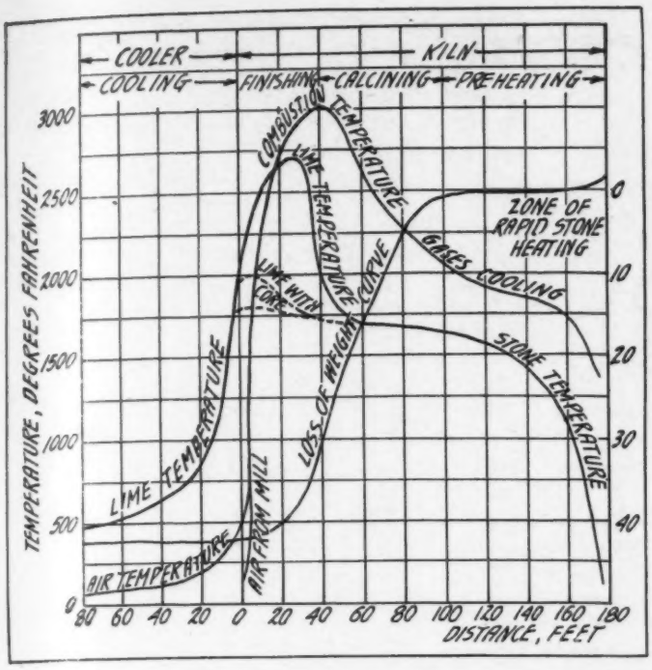
Unfortunately fast rotation and heavy charge oppose each other and a compromise must be effected. Some help may be obtained by a dam—a ring at the outlet. It is particularly at the outlet that it is desirable to hold back the lime, because to burn out the tiny core does not require much heat, but due to the insulating quality of the outer lime layer, it requires considerable time. The loss of weight curve in Fig. 1 shows how very slowly is the last bit of stone converted to lime. In spite of the high temperatures, 30 ft. of the most useful portion of the kiln is used to soak out 8% of the stone representing core. This means that 30% of the kiln is used to make 8% of the lime, because in the kiln proper are the calcining and the finishing zones wherein lime is made. The other 75 ft. is just a stone preheater which could be separate from the kiln; in fact, it would be better if it were separate.

The great bulk of heat is transferred by radiation from the flame to the charge, or from the flame to the lining and then to the charge, or from the flame to one part, then to another part of the lining and then to the charge. It thus becomes evident that effort should be made in the direction of greatest luminosity of flame; and consistent with this requirement the greatest temperature. Luminous, long, hot flame with little smoke is desired. Short hot flame will not do, neither will long and relatively cool flame. Over half of the heat is transferred as light, and therefore brilliancy is all important.

Flame Luminosity

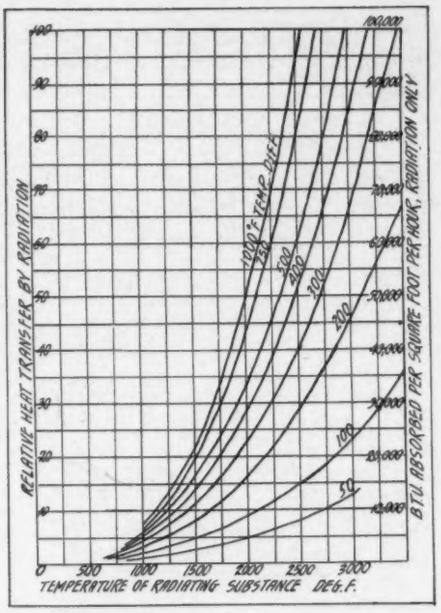
Carbon monoxide, hydrogen and methane flames are of comparatively low radiancy, particularly the first two. They will produce a hot flame but the flame is comparatively transparent as it lacks a reflecting element. Carbon is such an element. It glows with great brilliancy and this throws the heat across intervening space to the lime. Lacking this solid carbon to act virtually as a mirror, some heat is still radiated even by perfectly transparent gases, due to electronic rearrangements, but the amount is greatly less.

The second requisite for rapid heat transfer by radiation is temperature,



***LEFT:** Temperature relations of various kiln elements. The right-hand figures show percentage of loss in weight*

***RIGHT:** Relative heat transfer by radiation for various temperatures of radiating and heat absorbing surfaces*


RELATIVE HEAT TRANSFER BY RADIATION
BTU ABSORBED PER SQUARE FOOT PER HOUR, RADIATION ONLY
TEMPERATURE OF RADIATING SUBSTANCE DEG. F.

and high temperature is important indeed, because the heat transfer varies as the fourth power of the absolute temperature of the flame. Just 200 deg. would make a startling difference. Assuming a temperature difference between lime and flame of 500 deg. F., a flame of 2800 deg. F. would transfer 20% less heat than a flame of 3000 deg. F.

To make flame luminous requires unsaturated carbon gas—if natural gas is used it should be burned so that it will crack, liberating carbon in solid form, which means burning gas with little or no primary but mostly secondary air, the two mingled only gradually from stratified form. But this tends to reduce initial temperatures as heat is absorbed faster than generated and, as stated before, temperature also is exceedingly important in transferring heat to charge in such kilns as the rotary, which depend in the main upon radiant heat.

The soundest procedure is to burn natural gas as rapidly as practical and consistent with refractory limitations, and not depend upon it at all for radiant characteristics. Its purpose is to be to deliver the bulk of heat and highest of temperatures. Together with this a second fuel is injected in much smaller quantity but as rich in carbon as possible, whose purpose is to confer luminosity upon the whole flame mass.

Excess Air Losses

The burning of fuel with excess air reduces the temperature which is so important. Excess air increases kiln gas volume, and the heat from the fuel being spread over a greater gas weight, cannot raise it to so high a temperature level as a lesser amount of gas. This is particularly so when the air is cold. Not a pound of lime is made until the air is first heated, and of the heat so used hardly any will be available for lime making. Some small amount of it will be used for preheating the stone, but most will go up the stack. The statement will appear queer that the hotter the air entering kiln, the hotter will be the hot zone and the cooler the chimney. The best way, and in fact, the only way to cool the gases at the cool end, is to heat them at the hot end, which means low excess air in highly preheated form. It is not so much a matter of getting heat into the kiln, as to introduce this heat in most readily absorbable form.

Of the heat in the fuel, about 15% leaves the kiln as sensible heat of lime —as serious a drain as one can imagine, particularly as this heat recovered would all be useful for making lime. Some is returned but most is wasted. Some of the waste cannot be avoided but most of it can. If the heat were returned to increase kiln capacity, instead of 150 tons this capacity would be closer to 200; instead of about a 3.75 to 1 ratio of lime to fuel, it would be closer to 4.5. A greater effort along this one line only would in value of fuel exceed $15,000 a year. If labor saving and reduction of capital charges, on account of higher capacity, were also taken into account, the saving would exceed $30,000.

Kiln Efficiencies

It is possible with everything right to obtain a 38% rotary kiln efficiency, which means a lime to fuel ratio of 4.25 to 1, or a gas consumption of 7000 cu. ft. per ton of lime. One would call such a performance ideal, and contrasting with it we have the following poorest performances:

Heat balance of a poorly operated producer-gas fired plant as determined by the writer was:

Heat used for lime-making	21.2%
Heat lost in hot lime drawn	10.0%
Radiation loss from kiln	15.0%
Stack loss	35.0%
Heat to boiler for producer steam	12.0%
Producer radiation and carbon in ash	6.8%
	100.0%

In this case fuel ratio was only 2.12 lb. of lime per pound of very high grade coal.

An even poorer efficiency was obtained with natural gas sintering dolomite, in which case the heat balance was as follows:

Heat used in calcining dolomite	17.4%
Heat lost in product leaving kiln	6.0%
Stack loss	56.6%
Radiation loss from kiln	20.0%
	100.0%

In Production

BELLE ISLE LIME CO., Detroit, Mich., which has had a two rotary-kiln plant under construction since last spring, began production early in October. Geo. J. Nicholson is president and Theron C. Taylor, vice-president and general manager.

Employs Agency

STANDARD LIME AND STONE CO., Baltimore, Md., has placed its advertising account for "Capitol" rock wool insulation with Van Sant, Dugdale & Co., Inc., Baltimore.

TRAFFIC and TRANSPORTATION

Proposed Rate Changes

THE FOLLOWING are the latest proposed changes in freight rates up to and including the week of October 24.

New England

39783. To establish switching charge of 2c, minimum charge $7.65 per car at Rockland, Me., on quartz or silica sand switched from dock in plant of Lawrence Portland Cement Co.

40190. Crushed stone, Greenfield to Orange, Mass. Proposed—$25 per car. Reason—To enable the B. & M. to receive a haul on this traffic.

40258. To cancel, as obsolete, commodity rates provided in Item 25 of N. H. R. R. M. D. P. U. 1609 on stone, crushed, coated, West Quincy, Mass., to Bourne, Buzzards Bay, Hyannis, Pocassett, Sagamore and Sandwich, Mass., and apply rates on mileage scale:

Over 40, up to 50 miles, $1.10 per net ton.
Over 50, up to 60 miles, $1.15 per net ton.
Over 60, up to 70 miles, $1.20 per net ton.
Over 70, up to 80 miles, $1.25 per net ton.

Trunk

35235. To establish at Elizabethport, N. J., transfer of 25c per net ton on washed and dried sand from closed hopper bottom cars to hatch boats.

M-3556. Cancel in Curlett's tariff I.C.C. A-496 Item 5390—Limestone, agricultural, C. L., 60% of 6th class, from Erie R. R., N. Y. C. R. R., Nickel Plate, Buffalo-Pittsburgh District to Johnstown-Connellsville District. Item 5400—Limestone, crushed or screenings, C. L., 83⅓% of 6th class, from Pittsburgh District to C. F. A. and Canada. Item 7690—Slate products, 6th class, from Trunk Line to Official territory and Canada.

35240. To cancel, as obsolete, commodity rates on crushed stone, C. L., from Bethlehem and Lehighton, Penn., to L. V. R. R. stations, Corfu, N. Y., to Buffalo, N. Y., inclusive, and from Bethlehem, Penn., to Mill Hall, Penn.

35244. Gravel and sand (other than ground or pulverized or naturally bonded molding), in open top cars, without tarpaulin, C. L., from Pierce, W. Va., to White Sulphur Springs, W. Va., $1.60 per net ton.

35245. Sand rates from Olean, N. Y., to points in Ontario ranging from $2.10 to $5.20 per net ton.

35251. Stone, crushed, coated, C. L., (See Note 2), from Security, Md., to Charleston, W. Va., $2.70 per net ton.

35252 and 35253. Sand, naturally bonded molding, in open top or box car equipment, C. L., (See Note 2), from Catasauqua, Penn., to Kutztown and Emaus, Penn., 90c; to Lansdale and North Wales, Penn., $1.10; to Allentown, Penn., 70c; Easton (13th Street), Penn., and Phillipsburg, N. J., 90c, and Quakertown, Penn., $1 per net ton.

35255. Stone, broken or crushed, C. L., (See Note 2), from Oriskany Falls, N. Y., to various points in New York state on D. & H. R. R., rates of $1.20 and $1.30 per net ton.

35262. Crushed stone, C. L. (See Note 2), from White Haven, Penn., to points in Pennsylvania and New York on the D. L. & W. R. R., rates ranging from $1.10 to $1.30 per net ton.

35263. Crushed stone, C. L. (See Note 2), from Dunbar, Penn., to Lorain, Ohio, $1.70 per net ton. (Also on C. F. A. docket 48536.)

35273. To cancel Item 7980 of Curlett's I. C. C. No. A-496 providing class 20 rating on stone, crushed, or marble, crushed from Springwood, Va., to points in Official territory, as commodity will no longer be shipped from Springwood.

35277. Crude slag, C. L. (See Note 2), from Allentown, Penn., to Hokendauqua, Penn., 30c per net ton.

35282. Gravel, sand, slag and stone, crushed, coated with oil, tar or asphaltum, C. L. (See Note 2), from Pittsburgh, Penn., to Keyser, W. Va., $1.55 per net ton and to Hendricks, W. Va., $1.77 per net ton.

Central

48364. To establish on sand, C. L. (See Note 3), but not for closed and open top cars of less marked capacity than 60,000 lb. and 80,000 lb., respectively from Portersfield, Ohio, to points in Pennsylvania:

To Rep. Pts.	Cts.	To Rep. Pts.	Cts.
Altoona	210	Latrobe	190
Alverton	190	McKeesport	170
Beaver Falls	170	Monongahela	180
Bessemer	170	New Brighton	170
Blairsville	190	Oil City	220
Bradford	250	Rochester	170
Charleroit	190	Scottdale	190
Connellsville	180	Sharpsville	190
Caroapolis	180	Titusville	230
Corry	240	Warren	240
Duquesne	180	(W. Va.)	
Erie	220	Clarksburg	140
Greensburg	180	Grafton	150
Indiana	200	Warwood	150
Kittanning	190		

48371. To cancel rate on fluor spar, crushed; gravel fluor spar or lump fluor spar, in bulk or in barrels, ground fluor spar and fluor spar flux, when originating at points in Illinois or Kentucky, received from river or rail connections, to Pekin and Peoria, Ill., from Jeffersonville and New Albany, Ind., class rates to apply.

48393. To establish on gravel, sand, slag and stone, crushed, coated, C. L., from Pittsburgh, Penn., to Keyser, 155c, and Hendricks, W. Va., 177c per net ton, subject to emergency charges.

48401. To cancel commodity rates on sand and gravel, C. L., published in portions of tariffs shown from points in West Virginia, Ohio, Pennsylvania, New York, to points in New York, Maryland, West Virginia, Virginia, Pennsylvania, Massachusetts, Vermont, Maine, and Stanstead, Que.:

Agt. Jones' 218-J, Item 20800.
B. & O. Tariffs I. C. C. 22616, Page 8.
B. & O. Tariff I. C. C. 22784, Item 285.
Erie Tariff 510-I, I. C. C. A-7241, Item 1050.
N. Y. C. Tariff 140, Items 1585-A, 1595-A, 1600-A, 1605-A, 1610-A, 1645.
P. & L. E. Tariff B-3830, Pages 98, 99.
Agent Jones' Tariff 218-J, I. C. C. 2874, Items 14500, 14520, 14530, 14535, 14730.
Southern Ry. Tariff 900-B.

48404. To amend B. & O. R. R. Tariff H-3336-D, sand, blast, core, etc., from the Coalton group to points in Ohio, by adding "Porterfield, Ohio," as an origin point.

48405. To establish on glass sand, C. L., from Glass Rock, Ohio, to Centerburg and Mt. Vernon, Ohio, 80c in open top cars and 92c per net ton in box car equipment.

48406. To establish on crushed slag or crushed commercial slag (other than granulated), in open top cars, C. L., from Jackson, Ohio, to Hollister and Hunterdon, Ohio, 90c per net ton.

48409. To amend the following B. & L. E. R. R. Tariffs: I. C. C. 976, stone, crushed, fluxing, etc., from B. & L. E. R. R. stations to Illinois, Indiana, Maryland, Michigan, New York (Western portion), Ohio, Pennsylvania (Western portion), and West Virginia; I. C. C. 1023, stone, crushed, coated, from B. & L. E. R. R. stations to Maryland, New York (Western portion), Ohio, Pennsylvania and West Virginia; I. C. C. 1028, sand and gravel, from B. & L. E. R. R. stations to Delaware, District of Columbia, Maryland, New Jersey, New York, Pennsylvania, Virginia and West Virginia; I. C. C. 1029, sand and gravel, from B. L. & E. R. R. stations to Canada, Illinois, Indiana, Iowa (West bank Mississippi River), Michigan, Missouri, New York, Ohio, Pennsylvania, West Virginia and Wisconsin; I. C. C. 1046, stone, crushed, fluxing and slag, from B. & L. E. R. R. stations to Canada, Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia; by providing that "The minimum carload weight for new cars on first trip under load, will be 85% of marked capacity of car."

48410. To establish on crushed stone and screenings, C. L., from Bluffton, Ind., to New Castle, Ind., 60c per net ton.

48444. To establish on roofing granules, C. L., min. wt. 60,000 lb., (a) from Phalanx, Ohio, to Buffalo, N. Y., 200c; Chicago, Chicago Heights, Ill., 260c; Cincinnati, Ohio, 190c; E. St. Louis, Ill., 345c; Franklin (Warren Co.), Ohio, 190c; Joliet, Ill., 260c; Lockland, O., 190c; Lockport, N. Y., 200c; Lowell, Ind., 260c; Madison, 345c; Marseilles, Ill., 305c; Niagara Falls, N. Tonawanda, N. Y., 200c; South Bend, Ind., 260c; Vandalia, 345c; Waukegan, Ill., 290c per net ton. (b) From Phalanx, Ohio, and Darlington, Penn., to Cleveland, Ohio, 120c; Detroit, Mich., 190c; Erie, Penn., 130c; Lockport, 260c, and Wilmington, Ill., 305c per net ton.

48451. To cancel Item 4160, C. F. A. L. Tariff 130-X, publishing 75% of 6th class on gravel, crushed, from E. St. Louis, Ill., on shipments originating west of the west bank of the Mississippi River, to points in C. F. A. territory east of Indiana-Illinois state line and Trunk Line-Arbitrary territory. Classification basis to apply.

48452. To cancel Item 4170, C. F. A. L. Tariff 130-X, publishing 83.33% of sixth class on gravel, crushed, in bags or in bulk in box cars, minimum weight 50,000 lb., from points in C. F. A. territory to points in Canadian Freight Association territory. Classification basis to apply.

48455. To establish on roofing granules, C. L., min. wt. 60,000 lb., from Darlington, Penn., and Phalanx, Ohio, to Baltimore, Md., 326c; Bound Brook, N. J., 386c; Cliquot, Mass., 426c; Cly, Penn., 326c; E. Walpole, Mass., 426c; Fulton, N. Y., 326c; Genesco, Jersey City, Manville, Mauer, N. J., 386c; Millis, Mass., 426c; Philadelphia, Penn., 346c; Rutherford, S. Bound Brook, N. J., 386c; Stratford, Conn., 426c; York, Penn., 326c per net ton.

48456. To cancel class 16 rating on rock, bituminous asphalt, crude, crushed or ground, from East Bank Mississippi River crossings, and Ohio River crossings on traffic originating beyond, to Trunk Line territory. Classification basis to apply.

48466. To establish on agricultural limestone, unburned (not ground or pulverized), in bulk, in open top cars, C. L., from Narlo, Ohio, to Darrowville, Ohio, 115c per net ton.

48487. To establish on coarse filling material, such as limey bank slag, furnace slag and slag screenings, having no commercial value, C. L. (See Note 3), from Steubenville, Ohio, to Yorkville, Ohio, $15 per car, not subject to emergency charges, and to expire 90 days after effective date.

48500. To establish on (a) sand, naturally bonded moulding, in all kinds of equipment, C. L.; sand (except naturally bonded moulding; ground or pulverized sand), in closed equipment, C. L.; (b) sand, ground or pulverized, in all kinds of equipment, C. L.; and (c) sand (except naturally bonded moulding; ground or pulverized sand), in open top equipment,

*Note—The oil, tar and/or asphaltum not to exceed 10% by weight of the commodity shipped, the shipper to so specify on shipping orders and bills of lading.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

C. L., respectively from Falconer, N. Y.
Proposed Rates (In cents per net ton)

To	A	B	C
Buffalo, N. Y.	120	132	90
Cleveland, Ohio	170	187	135
Erie, Penn.	130	143	110

48505. To establish on **limestone**, pulverized, C. L., min. wt. 60,000 lb., from Alton, Ill., to Arkon, Ohio, 325c per net ton.

48507. To establish on **sand**, in open top equipment, C. L., from Phalanx, Ohio, to Caledonia, Galion, Marion, Martel, Ontario and Slicks, Ohio, 125c per net ton.

48508. To establish on **sand** (except industrial) and **gravel**, C. L., from New Albany, Ind., to North Vernon, Ind., 50c per net ton.

48509. To establish on **crushed stone**, C. L., in open top cars, from Lewisburg, Ohio, to Okeana, 90c, and Fernald, Ohio, 95c per net ton, subject to emergency charges.

48511. To establish on **dolomite**, roasted, C. L., from Durbin, Ohio, to Charleston, W. Va., 194c, subject to emergency charges.

48536. To establish on **crushed stone**, C. L., from Dunbar, Penn., to Lorain, Ohio, 170c per net ton, subject to emergency tariff.

48563. To cancel Item 4785, C. F. A. L. Tariff 130-X, publishing 60% of 6th class rating on **limestone**, black, in box cars, from E. St. Louis, Ill., on shipments originating at points west of the west bank of the Mississippi River, as defined in Note 42, page 102, to C. F. A. territory, except as noted. Classification basis to apply.

48569. To cancel class 16 rating on **stone**, crushed, **slag** and **gravel**, coated*, in open top equipment, from C. F. A. territory to T. L. A. territory. Classification basis to apply.

48589. To cancel rating of 75% of 6th class on **field rock or stone**, in natural state, min. wt. 60,000 lb., from E. St. Louis and Kellogg, Ill., on shipments originating at points in the state of Missouri, to C. F. A. territory. Classification basis to apply.

48604. To cancel rating of 80% of sixth class on **paving composition**, mixed, consisting of **gravel** or **crushed stone** and **sand** and asphalt or pitch or tar combined, (See Note 1), from Indianapolis, Ind., to points in Indiana. Classification basis to apply.

48618. To establish on **crushed stone** and **crushed stone screenings**, in open top cars, C. L., from Hillsville, Shaw Junction and Walford, Penn., to Bristol, Cairo, Ellenboro, Flemington, Greenwood, Lost Creek, Morgansville, Pennsboro, Petroleum, 180c; Ripley, 200c; Salem, 180c; Spencer, 200c; Smithburg and West Union, W. Va., 180c per net ton.

48629. To establish on **limestone**, C. L., from Brier Hill Works of the Youngstown Sheet & Tube Company, Youngstown, Ohio, to Campbell Works of the Youngstown Sheet & Tube Company, Youngstown, Ohio, $13.20 per car, plus emergency charge, to expire December 31, 1936.

48646. To cancel commodity rates on **stone**, crushed, rip rap, chips or waste; **stone**, natural, other than bituminous asphalt rock, crushed; **stone**, broken or crushed, and **stone screenings**; **stone**, natural, crushed; **gravel**, crushed or ground; **limestone**, crushed or ground; **limestone**, agricultural, unburned; **limestone**, agricultural (not ground or pulverized), from points in Ohio, West Virginia, Pennsylvania, New York and Illinois to points in New York, Maryland, Massachusetts, Virginia, West Virginia, Pennsylvania, New York, Maine, Quebec and Washington, D. C. Classification basis to apply.

B. & O. R. R. Item 24060, C. F. A. I. Trf. 218-J. Also item 365.

B. & L. E. R. R. Page 10 and page 13 I. C. C. 993.

Erie R. R. Item 590 of Erie R. R. Trf. 510-I.

N. Y. C. R. R. Trf. 140-I. Items 2015, 2020 and 2025.

48648. To establish on **fuller's earth**, C. L., from Olmsted, Ill., to Detroit, Mich., 580c minimum weight 40,000 lb. and 460c per net ton, minimum weight 70,000 lb., subject to emergency tariff.

48673. To establish on **limestone**, agricultural, unburnt, in bulk, in open top cars, and screenings, agricultural limestone, C. L. (Rates in cents per ton of 2000 lb.)

To	From Marion, O.	From Carey, O.
Roswell Ohio	125	125
Washington C. H., Ohio.	100	115
Marietta, Ohio	...	145

48649. To establish on **stone**, crushed, and screenings, in straight and mixed carloads (will not include agricultural limestone or ground limestone, unburnt, fluxing stone or firestone, or stone coated with oil, tar, asphaltum or similar bituminous materials), from East Fulthonham, Ohio, to Spencer and Ripley, W. Va., 170c per net ton, subject to emergency charges.

48650. To establish on **crushed stone**, in open top cars, C. L., from Greencastle, Penn., to Kokomo, Ind., 88c, subject to emergency tariff.

48651. To establish on (a) **Sand**, naturally bonded moulding, in all kinds of equipment, C. L.; sand (except ground or pulverized), in all kinds of equipment, C. L. (b) Sand, ground or pulverized, in all kinds of equipment, C. L. (c) Sand (except naturally bonded moulding; ground or pulverized sand), in open-top equipment, C. L., from Carl, Penn., to points in Connecticut, Illinois, Indiana, Iowa, Kentucky, Maine, Maryland, Massachusetts, Michigan, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia and Wisconsin, rates the same as now published from Jones Siding, Penn., as in N. Y. C. R. R. Tariff 1362, and N. Y. C. Tariff 140.

48684. To cancel commodity rates in P. R. R. Tariff 11-D: **Sand**, burnt or refuse, foundry; **shells**, mussel, refuse; **stone mixture**, ground; **fluorspar**, crushed, ground or lump; from points in Indiana, Ohio, Kentucky and Michigan to points in Michigan, Indiana, Illinois, New York, Kentucky, Ohio, Missouri, Pennsylvania, West Virginia, Iowa and Upper Mississippi River crossings. Classification basis to apply.

48685. To establish on **fluxing stone**, in bulk in open top cars, in straight or mixed carloads, from Marble Cliff, Ohio, to Coshocton and New Comerstown, Ohio, 92c per gross ton.

48749. To establish on **sand and gravel**, except industrial, in open top cars, C. L., from Brink Haven, Ohio, to various Ohio destinations:

B. & O. R. R.—Vanatta, 80; Ankenytown, 75; Lexington, 80; Forest, 85; Willard, 90; Pontiac, 95.

C. C. C. & St. L. R. R.—Linndale, 100; Berea, 105; Grafton, 100; Rochester, 95; Greenwich, 90.

Erie R. R.—Silver Creek, 95; Creston, 90; Burbank, 85; Polk, 90; Ashland, 85; Dyke Siding, 80; Galion, 85.

W. & L. E. R. R.—Lodi, 85; Burbank Spur, 90; Smithville, 85; Snively, 85; Brewster, 90.

48760. To establish on **glass sand**, C. L., (See Note 3), from Glass Rock, Ohio, to Salem and Scio, Ohio, 125c and 105c per net ton, respectively (applies in open-top cars; in closed cars, rates to reflect 115% of open-top cars).

Southern

12631 (Amdt. 1). Amended to change description, proposed rates from Tyrone, Ky., to Shelbyville and Harrodsburg, Ky., to: "**Limestone, crushed, ground or pulverized**"; also provide that rates expire June 30, 1937.

12827. **Feldspar**, C. L., minimum 80,000 lb. Establish rates from Erwin, Tenn., Minpro, Spruce Pine, Toecane, Bowditch and Cane Branch, N. C., to S. W. F. B. territory, reflecting same difference in cents per net ton that rates from Keystone, S. D., with minimum weight of 80,000 lb. are lower than rates from that point with a minimum weight of 50,000 lb. To alternate with rates subject to minimum weight of 50,000 lb.

12844. Amend min. wt. in S. F. T. B. Tennessee Limestone Tariff 248-A, governing rates on **limestone**, ground or pulverized, C. L., in open top equipment, to provisions of Note 3.

12892. **Oyster shells**, C. L., as per Item 230, Emerson's Tariff 9-E. Establish rates from Bayou La Batre, Ala., Berwick, La., Biloxi, Gulfport, Miss., Houma, La., Mobile, Morgan City, Ala., New Orleans, La., Pensacola, Apalachicola, Fla., to London, Elmira, Hanover, Harriston, Listowel, Seaforth, Stratford, New Hamburg, Ont., same as from Mobile and Bayou, La Batre, Ala., except from Apalachicola, Fla., 4½c cwt. higher than suggested from Mobile, Ala.

12982. **Fuller's earth**, in bags or sacks or in bulk in box cars, C. L., minimum 50,000 lb. Establish, to Panama City, Fla., for export to all foreign countries, from: Attapulgus, Ga., Jamieson, Midway, Quincy, Fla., 300c; Superior, Fla., 390c net ton.

12983. **Wet phosphate rock**, C. L. Establish transit rate of 10c gross ton, not subject to emergency charge, Hopewell, Fla., to Coronet, Fla., to be dried and reshipped via S. A. L. Ry.

Western

E-41-183. **Riprap stone**, C. L. (See Note 3), but not less than 40,000 lb. (Rates in cents per ton of 2000 lb.) From Glen Rock, Weeping Water, Louisville, Auburn, Johnson, Rohrs and Nehawka, Neb., to Onawa, River Sioux, and Mondamin, Ia. Rate proposed, $1.02 per net ton, not to be published unless actual movement develops.

D-41-184. **Core sand**, in box cars, from Milwaukee, Wis., to Decatur, Ind. Proposed —210c per net ton.

D-203-3. **Slag**, C. L. (See Note 1), but not less than 60,000 lb., from Omaha, Neb., to Kansas City, Mo. Proposed—Cancel present rate; class rate to apply.

D-43-30. **Stone**, as in Item 6740 of W. T. L. Tariff 5-P, from St. Louis, Mo., group to St. Paul, Minn., group. Proposed, 18c per 100 lb.

Southwestern

9478. To establish Class 32 rating on **clam and mussel shells**, not crushed or ground, in bags, barrels or boxes, less carload, from origins in state of Arkansas to the Louisiana and Texas Gulf ports when for export to foreign countries, such rates to apply to shipside and to be subject to addition of emergency charges.

9537. To provide for stopping in transit privileges to finish loading on **mussel and clam shells** from points in Oklahoma, also various other states named in paragraph (a), Note 1, Item 2950-A, S. W. L. Tariff 174-H, to Memphis, Tenn., by including Memphis, Tenn., as a destination point.

9560. To establish rates on **chatt sand**, carloads (See Note 3), minimum weight in no case, however, to be less than 40,000 lb., from Webb City, Mo., to Belleville, Ill., $2.48 per net ton, and to New Athens and O'Fallon, Ill., $2.59 per net ton.

9569. **Gypsum rock**. To establish rate of 185c per net ton, carloads, from Acme, Tex., to Ada, Okla.

Illinois

4669-A. **Stone**, crushed or ground, C. L., from Quincy, Ill., to Madison, Wis. Proposed —$2.14 net ton.

5301. **Silica sand**, C. L., from Browntown, Wis., to St. Louis, Mo. Proposed—$2.30 net ton.

7873-B. **Slag**, C. L. (See Note 3), but not less than 60,000 lb., from Chicago, Ill., to St. Louis, Mo. Proposed, $1.76 net ton.

Texas-Louisiana

7740-TX. **Rough stone** from Fox Quarry No. 2 to Lueders. Establish a rate of $10 per car not loaded in excess of 10% above marked capacity of the car used. When cars are loaded in excess of 60,000 lb., the excess shall be charged for on same basis as the 60,000 lb.

9994-TX. **Road gravel**. To establish a per ton rate of 66c from Klimek and the siding mentioned in Section 2 and 81c from West Point and Leevan, to Houston, subject to expire June 30, 1937. Proposed rate is necessary in order for shipper to meet competition from barged shell.

Growing Responsibility of Employers

May Lead Eventually To Employment Only for Those Nearest Perfection, Physically and Mentally — National Safety Congress Meeting, Atlantic City

THE SPREAD of employers' liability by state legislation to cover occupational diseases, as well as the growing knowledge of the relationship of faulty bodies and minds to accidents, is leading directly to the shouldering of the world's work on the fittest specimens of humanity. The constantly greater use of complicated machinery for human labor calls for workmen with better than average brains, and eliminates the necessity for work by men of little brains. That means, if it means anything, that men of the future will have strong economic motives for clean, healthy bodies and alert minds.

Attendance at a few sessions of the Cement and Quarry Sections of the National Safety Congress, Atlantic City, N. J., October 6 and 7, left an impression with the editor that our national unemployment problem is going to become more complicated as time goes on.

Cement Section

The new officers elected were F. B. Hunt, Nazareth Portland Cement Co., Nazareth, Penn., general chairman, succeeding D. B. Coleman, Missouri Portland Cement Co., St. Louis, Mo.; W. J. Worthy, Medusa Portland Cement Co., Cleveland, Ohio, vice-chairman, succeeding Mr. Hunt.

The program included "Analysis of Accidents in the Cement Industry," prepared by A. J. R. Curtis, Portland Cement Association, and read in his absence by Wm. C. James, of the Association's staff. The most interesting part of this related to a study of absenteeism from all causes, a full report of which will be published in the December issue of ROCK PRODUCTS.

John Norvig, superintendent, Lone Star Cement Co., Hudson, N. Y., and a group of fellow employes illustrated dramatically how plant safety meetings could be made interesting and instructive. By picking out of the P.C.A.'s accident reports some one else's accident, and, assuming what appeared to be the particular conditions surrounding it, this accident was made the subject of inquiry and investigation. This question and answer, or dialog, style of getting over many safety ideas is quite effective, and is practically a guarantee that the same kind of an accident will not happen at one's own plant.

J. H. Kempster, general superintendent, Universal Atlas Cement Co., Buffington, Ind., under the title "What a Foreman Can and Should Do After One of His Men Is Injured" illustrated his remarks by a motion picture. Particular stress was laid on the foreman showing a human interest in the most inconsequential employe, by calling on his family, on the injured man, etc.

A. J. Little, superintendent, Medusa Portland Cement Co., Bay Bridge, Ohio, discussed "Depression Hazards and What to Do About Them," and W. H. Grady, safety director, Canada Cement Co., Ltd., Montreal, Que., "Planning Safety for the Shutdown Period." In the latter case, the fact that workmen are scattered about the plant doing repair and replacement work adds hazards of a special nature.

Wm. C. James, Portland Cement Association, talking on "The After-Work Program," described safety and health programs for the industry's employes outside of working hours, and community safety programs, sponsored and promoted by cement company organizations. These, he said, (1) establish a high employe morale; (2) increase the percentage of healthy, coöperative employes; (3) build community goodwill.

Quarry Section

The officers of the Quarry Section were reëlected as follows: General chairman, Alex. Foster, Jr., Warner Co., Philadelphia, Penn.; vice-chairman, Russell Rarey, the Marble Cliff Quarries Co., Columbus, Ohio; secretary and news letter editor, N. B. Sipe, J. E. Baker Co., York, Penn.

Otho M. Graves, president, General Crushed Stone Co., Easton, Penn., made an informal, unrecorded address on "The Viewpoint of the Employer Toward a Safety Program," which was followed with extreme interest by every one present. Interspersed with personal reminiscenses and philosophical observations he told a most engaging and instructive story of his company's experience some years ago with a profit-sharing plan.

This plan placed considerable responsibilities for the conduct of the business of the individual plants on "plant boards of directors," composed of himself as president and general manager, the superintendent, and three employes elected by the entire group. This board was responsible for hiring and firing—not as in most cases, the exclusive right or privilege of the superintendent. Naturally this board came to have responsibility for the safety of the plant's employes. One thing proved again was that the way to cure a radical is to give him a little experience in shouldering responsibility.

Unfortunately the years of the depression made an end, at least temporarily, of the General Crushed Stone Co.'s profit-sharing plan, but Mr. Graves did drive home very vividly the need of one item frequently left out of corporation profit-sharing plans in general—the need of impressing the employe that he is also sharing the responsibility for making profits. If this idea could ever be gotten across in a big way, with our intelligent American workmen, our labor controversies would disappear.

F. B. Kimball, superintendent, Middlefield plant, New Haven Trap Rock Co., New Haven, Conn., described at length "The Viewpoint of the Employer Toward a Safety Program."

Franklin K. Wills, superintendent, Morrisville plant, Warner Co., Philadelphia, Penn., had an illustrated paper on his safety program, which is published in full elsewhere in this issue.

Silicosis

Dr. Roy R. Jones, division of labor standards, U. S. Department of Labor, Washington, D. C., on "Silicosis, an Occupational Hazard," discussed interestingly and instructively a subject of major interest to nearly all rock products producers. He especially emphasized the need of careful and thorough pre-employment physical examinations "for the purpose of placing workers in po-

sitions which they are physically fit to carry on with safety to themselves and their fellow-workers."

"No convincing evidence is available to show that a non-disabling silicosis affecting a worker will progress more rapidly if the individual remains at work under *conditions reasonably controlled*, than if he is given another type of work," he said. "Therefore, those without evidence of active pulmonary infection may be safely employed in any capacity, provided the conditions under which they are working are reasonably controlled. We have proof that individuals with active tuberculosis will have their condition aggravated by silica exposure, and that individuals with silicosis are particularly susceptible to pulmonary tuberculosis.

"When managements fail to take the necessary precautions to guard against the placing of men with tuberculosis in a dusty environment, they increase the problem of controlling tuberculosis among the population as a whole. Since any pulmonary infection may be such an important contributing factor in disabling silicosis, the relationship of the medical personnel to the employe should be such that he is assured immediate advice and early treatment, if necessary, for respiratory infections which may develop during the period of employment.

"Physical examinations made at regular intervals afford an opportunity for early detection of any harmful effects due to working environment. Where they are found, plant conditions may be corrected before serious injury results. The frequency with which these examinations should be made will depend upon the physical condition of the men and the nature of the process in which they are engaged. For this reason, it is highly important that the medical personnel be familiar with the condition of the men upon entering employment, and with their later physical condition. They must also know the physical requirements of the occupation, the particular health hazards associated with it, and the practical means of rendering conditions of employment safe."

T. C. Waters, an attorney of Baltimore, Md., discussed the legal phases of employers' liability for silicosis, pointing out the different status in those states which have workmen's compensation laws covering industrial or occupational diseases and those in which the liability depends on the common law only. He outlined a typical suit under the common law and the general nature of the defense.

Naturally, as do all enlightened, interested parties, he favored adequate compensation laws, but warned that these should not be allowed to become so comprehensive as to be actually health insurance. He did not favor national legislation along this line; he said every state had its own individual problem to solve.

To Make Ready-Mix

MIDWEST BUILDERS' SUPPLY CO., Cincinnati, Ohio, recently incorporated, has taken over the property formerly occupied by the Huber Building and Material Co., West Norwood, and will operate a ready-mixed concrete plant. C. L. Smith, president, formerly was associated with the Moores-Coney Building Supply Co. for 10 years. Before that he was with the American Gypsum Co. for 10 years and the United States Gypsum Co. for one year.

Adds Ready-Mix

WESTERN INDIANA GRAVEL CO., Terre Haute, Ind., has added ready-mixed concrete to its products.

Meets Strong Demand

HANERCH READY MIX CONCRETE CO., Norristown, Penn., has recently placed a new ready-mixed concrete plant in operation.

New Plant

CORPUS CHRISTI DUNBRIK CO., Corpus Christi, Tex., W. F. Carter, president, has completed a $25,000 plant at 2201 Lipan St. to make concrete brick. Capacity is 3000 brick per hour from a new W. E. Dunn Manufacturing Co. machine.

Buys Quarry

FRANCE STONE CO., Toledo, Ohio, has purchased the Earl J. Sherburn and Son quarry in Union township, near Van Wert, Ohio. It is said the new owner will operate the plant and make extensive improvements.

Proposed Gravel Plant

MAULE-OJUS ROCK CO., Miami, Fla., has applied for a permit to operate a sand and gravel plant on the Miami river bank at 501 N. W. South River drive. Local residents have protested.

Awarded Highway Contract

KENTUCKY-VIRGINIA STONE CO., Asheville, N. C., has been awarded a $585,637 contract for construction of a 7-mile section of the Blue Ridge Parkway.

New Gravel Plant

G. G. HILL CO., Dexter, Mo., has built a new sand and gravel plant on the Cotton Belt Ry. about half way between Dexter and Idalia. It will supply ballast for the Cotton Belt.

Concrete Pavement Yardage

AWARDS of concrete pavement for September, 1936, were announced by the Portland Cement Association as follows:

Type of Construction	Sq.yd. awarded during Sept., 1936	Total sq. yd. for year to date, Oct. 3, 1936
Roads	5,196,304	29,575,034
Streets	2,380,698	11,802,372
Alleys	35,855	290,031
	7,612,857	41,667,437

Rock Wool Project

CAMPBELL ROCK WOOL CO., Meyers Rd. and Lyndon Ave., Detroit, Mich., was recently organized to build a $50,000 plant to make rock wool. H. L. Pierson is president; Lee R. Campbell, chief engineer.

Fire Loss

STANDARD SLAG CO., Ashland, Ky., plant was destroyed by fire recently; loss about $100,000.

Recent Publications

STUDY of the System CaO-SiO_2-H_2O at 30C. and of the Reaction of Water on the Anhydrous Calcium Silicates; by E. P. Flint and L. S. Wells. Research Paper RP687, part of Bureau of Standards Journal of Research, Vol. 12, June 1934. The experimental study of the system lime-silica-water described in this paper possesses practical value not only for its direct bearing upon the problem of the setting of portland cement and hydraulic mortars but also because of possible applications in fields of geology, soil equilibria and water purification. In this report the relationship of the system to products formed by the reaction of portland cement with water are especially considered.

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SKIDDING CHARACTERISTICS OF ROAD SURFACES; by Prof. R. A. Moyer of Iowa State College. Research Series No. 2, The Asphalt Institute. This is a very interesting paper, and should be well worth reading for engineers, safety organizations and for all drivers of cars. Tests are discussed in detail and results summarized for practically all roads and conditions encountered in driving.

Long-Life Hose

MANHATTAN RUBBER MANUFACTURING Division, Raybestos-Manhattan, Inc., Passaic, N. J., has been granted a patent for its radio-active treatment of fire hose for municipal and industrial plants, designed to make it permanently resistant to mildew, moisture repellant, rot and freeze proof. It involves processing the cotton fabric with rare earth metal salts having radio-active properties.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Builds New Concrete Products Plant of Five Times Original Capacity

Demands for Home Construction Require Maximum Output of Kansas Firm

A recent Topeka house job of random ashlar

THE INCREASING demand for concrete products in home construction has prompted the Kirkham Concrete Products Co., Topeka, Kan., to enlarge and improve its manufacturing facilities to make quality concrete products.

The Plant

A new all-modern plant was built and put into operation the first of August. It is said that this plant is the most modern plant west of Detroit. Originally, the firm was purchased by John E. Kirkham from Frank Whelan in 1934.

The plant and yard of the company cover approximately half a city block, with the plant proper being housed in a building 30 ft. by 90 ft. on North Tyler St. Main products manufactured are concrete masonry units, concrete blocks, concrete joists, portland cement stucco and texture plaster.

Largest Mixer

Sand and gravel is elevated to a three-compartment bin at the top of the plant, and flows by gravity to a weighing batcher, where it is accurately weighed. Cement is elevated to this level by a mechanical sack elevator, and from this point it is dropped into the mixer. The concrete mixer is said to be the largest of its type in the United States and will handle 60 cu. ft. in a single mix.

Automatic Machinery

From the mixer the concrete is chuted by gravity to the latest model Besser automatic stripper. The complete cycle of operations necessary in the manufacture of the block is completed at the rate of 6½ standard blocks per minute. Approximately 3600 standard 8x8x16-in. units are made per day or 36,000 concrete bricks.

After stripping, the block are placed on small carts and placed in the kilns. Summer curing is done by a fog spray and steam is substituted in cold weather. Recently, an all concrete masonry house of Kirkham units was completed by Fred P. Smithmeyer in Westboro. Concrete brick are being sold in competition with clay brick and at a lower price. Concrete joists are of the modified I-beam type, heavily reinforced with wire mesh.

New plan and storage yard of Kirkham Concrete Products Co.

"Beauty in concrete" could well describe this church of Kirkham units

The new plant has a capacity approximately five times that of the original installation and employs approximately 10 persons at the plant.

Going After Housing Market

PRECAST CONCRETE Co., Portsmouth, Ohio, formerly known as the Superior Waitex Co., has leased the property of the Kelley Bros. Construction Co. on Broadway street for the production of precast concrete products. The units produced will be cinder building blocks, precast concrete joists, floor slabs, cast stone Coloroc floor and wall tile and other units. In addition to these a true portland cement paint will be produced, known as Waitex. Paul A. Kanengeiser and Patton Davis have operated under a partnership for the last year as the Superior Waitex Co. Recently with other associates they formed the Precast Concrete Co.

New Plant

HELENA CONCRETE PRODUCTS Co., Helena, Ark., a new company, is building a plant to make concrete brick. J. E. Daniels, Jr., is president.

Adds Brick Product

AUBURN CONCRETE PRODUCTS Co., Auburn, Wash., C. M. Long, president, has added both common and face concrete brick to the company's line.

Digest of Foreign Literature

By F. O. Anderegg,
Consulting Specialist in Building Materials, Newark, Ohio

The Mechanism of Slaking Burned Lime—Some objections are raised to the proposal of Rodt (ROCK PRODUCTS, 1936, No. 6, p. 58) that the hardening of lime is a drying out of colloidal gel followed by carbonation, by W. Dawihl, R. Flueshoeh and K. May. They point out the strengths obtained are only a small fraction of those obtained with true gel systems such as silica or alumina gels, so that the gel character of calcium hydroxide must be rather weak. The rather complete loss of moisture from calcium hydroxide, even at high relative humidities, varies considerably from the behavior of true gels. They have also found that briquettes cured out of contact with CO_2 gave the same strength whether prepared from thin slurry or from dried putty and so concluded that the fineness of the calcium hydroxide crystals is responsible for the practical values of slaked lime. X-ray photographs made of milk of lime prepared by burning marble and slaking in the usual way gave no indication of the rings which characterize amorphous gels, while the lines corresponded exactly with those given in the literature for crystalline calcium hydroxide. Moreover the sharpness of the lines indicates that very little submicroscopic material is present.

Some experiments were made on hydrating lime with methanol solutions. In the first, to 10 g. CaO was added 4 of water and 36 of methanol; in the second, 20 water and 180 methanol; in the third 20 of water and 30 methanol. No perceptible reaction occurred in the first two during two hours, while in the third opalescence was visible in the liquid in a few minutes and the lumps had broken down. The same thing happened in the first two experiments in 24 hours except that after shaking, the hydroxide settled very rapidly leaving a clear supernatant liquor. In the third experiment the crystals were sufficiently finely divided to cloud the whole liquid phase, and the product had the appearance of ordinary slaked lime. On examination it was found that the size of the crystals produced in methanol where just sufficient water was present to combine with the CaO, was about 300 microns in dimension; in the third experiment the crystal size was in the range 20 to 40 microns; and when slaked with pure water to form a usual milk of lime, the mean size was about 2 microns. The putty yield is, of course, greatly influenced by the crystal size. Traces of silica have considerable effect on the putty yield by changing the rate of slaking. The X-ray photograph of calcium hydroxide prepared in methanol solutions gave a new pattern, suggesting another crystalline form of the hydroxide. *Tonindustrie Zeitung* (1936) 60, No. 62, p. 761.

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Studies on Iron Cements VI—When various cements were made into test pieces and stored in water or in 10% solution of sodium chloride or sulfate, it was found that a high silica cement, prepared by grinding portland clinker with 20% of its weight of reactive silica, and several high iron cements showed much lower volume change and greater strengths in the salt solutions than straight portland. The heats of hydration were also lower, so that several of these are much better fitted for mass concrete. These results were obtained by S. Nagai, K. Nomi and K. Inoue. *J. Soc. Chem. Ind. Japan* (1936), 39, No. 7, p. 215B.

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The Slaking of Lime—A method of determining the rate of slaking of lime has been proposed by P. P. Budnikoff and L. Gulinova using a diphenyl calorimeter. Samples of marble, limestone and chalk were burned for two hours at a given temperature and then slowly cooled. Lime burned at about 1100 deg. C. seemed to hydrate most actively, with the limestone product being most sluggish and the marble product hydrating most rapidly. On adding a variety of solutes to the hydrating water, in 1% concentration, NaOH produced most acceleration, with the chlorides of calcium, sodium, magnesium and ammonium also speeding up the slaking. *Tonindustrie Zeitung* (1936) 60, No. 73, p. 901.

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Evaluation of Clinker Quality—The use of unit weight of portland cement clinker passing a 7-mm. sieve but retained on a 5-mm. sieve (approx. 3- and 4-mesh) has been used by Wilhelm Anselm for determining the quality of the clinker. As the burning proceeds the clinker becomes denser, and a direct correlation was obtained between time of burning, unit weight, unsoundness, free lime content, setting time, resistance to grinding, and development of the petrographic structure. No correlation, however, could be found between the unit weight and shrinkage tendency of mortar, although in one series a minimum was observed for 1.4 kg. per liter. The strengths seem to go through a maximum for unit weights of 1.4 to 1.5 (i.e. at about 90 lb. cu. ft.). Unsound cements were below 1.25 and the free lime content was found to fall below 1% when the unit weight reached 1.35. The resistance to grinding and the crystalline structure increase with the density. *Zement* (1936) 25, No. 38, p. 633.

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Very Hard Aggregates for Concrete—It is occasionally desired to produce concrete of very high resistance to abrasion and impact and for such uses the quality of the aggregate chosen is very important, so that A. Guttmann has made an extended study of this question. He finds, for instance, that it requires aggregates of hardness 7 or more on the Mohs scale to meet the Imperial Railways' specification for hard concrete. The mortar must also contain at least 20% of corundum or carborundum, with a maximum of grains passing a 1-mm. sieve at 20%. To secure such results the aggregates must be appreciably more resistant to abrasion than Rhine sand; that is, in a 1:1 mix with the quantity of water required on the job, and placed as usually handled on the actual job, after 7 days under wet cloth, and tested after 28 days, the loss in the standard abrasion test must not exceed 0.2 cu. cm./sq. cm. Guttman suggests a practical value of about 0.16, which is twice as great a loss as is permitted by the present German Railways' specification. No materials should be used which set free appreciable quantities of tin or lead oxide in the mixing water. Carborundum is especially abrasion resistant, while corundum has good abrasion resistance and excellent impact resistance. *Zement* (1936) 25, No. 34, p. 571; No. 35, p. 588.

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The Distinction Between Hydraulic Limes and Cements. As it is not always easy to determine whether a given material is a hydraulic lime or a cement, G. Baire proposes a method based on the comparison between two results obtained by determining the ignition loss before and after artificial hydration. For the latter operation 5 grams is weighed into a very large test tube containing 25 ml. water and it is shaken for 5 minutes vigorously and filtered without washing. The residue on the filter paper is dried at 100 to 110 deg. C. and cooled for 10 to 12 hours. The solid material is removed from the filter paper, ground in a dry mortar and ignited. The ratio of the second loss to the first is used as criterion, with most limes having a ratio lying between 1.00 and 1.25 and most cements above 1.75. Then 1.50 may be used as a dividing point. *Revue Materiaux Construction Travaux Publics.* (1936) No. 317, p. 25.

DIRECT FIRING of ROTARY KILNS

Advantages Claimed and Experience Recorded for Recently Developed Type of Coal Pulverizer

By R. M. HARDGROVE,
Engineering Design Division,
Babcock & Wilcox Co.,
New York City

THE SIMPLICITY of direct firing of rotary kilns was realized some years ago, and several installations were made using impact pulverizers, which were the only types then available for direct firing. These installations were not successful for four reasons:

(1) The fineness was poor initially and dropped off rapidly as wear of the pulverizer grinding elements progressed.

(2) Frequent changes of hammers or paddles and damage due to tramp iron caused frequent shutdowns.

(3) The feeders were not adequately controlled and the supply of coal to the burners was not as uniform as it should have been.

(4) They were incapable of handling very wet coal.

From 1927 to 1930, eight direct-fired kiln installations using Fuller Bonnot pulverizers were made. These installations are all in successful operation and have proved to be dependable.

The development of the B&W Type B pulverizer provides one of remarkable reliability and one that maintains uniformly high fineness of output, unaffected by wear of the grinding parts, and uniformly delivers coal to the burners. These are the principal characteristics required to make direct firing of kilns successful.

The economic advantages of direct firing are briefly stated under the following divisions.

Labor Saving

With direct firing, the kiln operator also operates the pulverizers, thus saving all the labor required for operation of the coal house. Records show that an average cost of labor for a separate coal house, plus maintenance of dryers and other equipment (excepting pulverizers) has been about 1.2c per bbl. Assuming an annual production of one million barrels, the saving due to the elimination of this labor amounts to $12,000 per year.

Power Saving

Elimination of the power required for driving dryers, dryer fans, transport systems, and feeders will easily save 4 kw.-hr. per ton of coal. Modern pulverizers also show a saving in power over older installations. For the million-barrel output with 100 lb. of coal required per bbl., and with power at 0.8c per kw.-hr., this saving is equal to $1600 per year. We understand that in present accounting methods of the cement industry, the fans for supplying primary air to kilns are considered a kiln-house charge. In direct firing the fan is part of the pulverizer. For comparative cost studies, therefore, the power for driving storage system fans should be added to coal-house costs.

Fuel Saving

There is a saving of the coal used for firing the dryers (from ½ to 1% of the total coal used). Vent losses make up another unknown amount, equal, perhaps, to several per cent of the total amount of coal used. Modern direct-fired installations have shown an actual saving of 10 to 15 lb. in coal consumption as compared with storage-system operation of the same kilns. Using a saving of 12 lb. per bbl. and coal at $4.50 per ton (net), this saving for the million-barrel output equals:

$$\frac{1{,}000{,}000 \times 12 \times \$4.50}{2000} = \$27{,}000 \text{ per year}$$

Summing up the foregoing items,

Labor	$12,000
Power	1,600
Coal	27,000
The total saving is	$40,600

Cleanliness

Direct firing is especially clean, as there are no vents emitting clouds of coal dust over the entire plant. Fur-

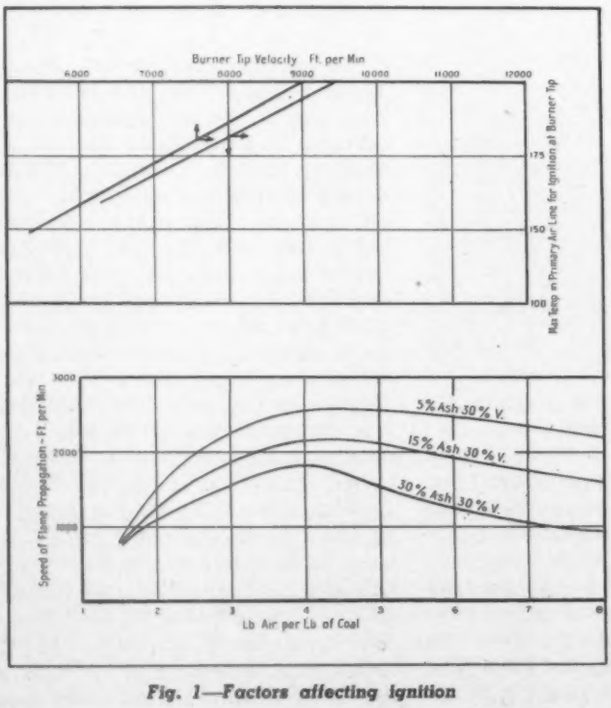


Fig. 1—Factors affecting ignition

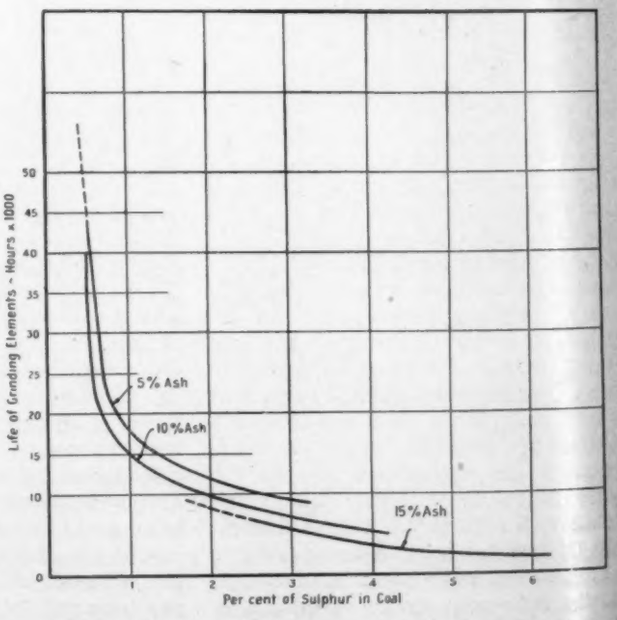


Fig. 2—Effect of sulphur and ash in coal on life of grinding elements

thermore, pulverized coal invariably takes fire if left standing in bins any length of time. The dirt and nuisance of emptying the bins in such cases are avoided with direct firing.

Safety

Storage systems are hazardous, as explosions have been known to occur, and overflowing of bins has resulted in serious fires. This disadvantage is almost entirely eliminated in direct-firing systems, as the pulverized coal is used as soon as produced and the air in a pulverizer is too rich in coal to support combustion. Furthermore, the pulverizer and piping are all of welded steel construction of ample strength to withstand any pressure that may result from an explosion.

Coal Savings

On first thought it may seem hard to explain the reasons for the actual coal savings made with modern direct-firing installations. The elimination of dryer and vent losses will account for several per cent, but not for the 10-15 lb. per bbl. actually obtained.

There are two additional factors that are of utmost importance: uniform feeding and dispersion.

Uniform Feeding

Screw feeders used with storage systems have not been successful in giving even feed. Aërated coal in a freshly filled bin has a tendency to flood through the screw, and rat-holing and packing in the bin have produced feast-and-famine conditions of feed. The use of Bailey feeders has improved this condition materially, but the feed of coal is still influenced by bin conditions. It is easy to realize that coal is absolutely wasted during flooding, as the excess over that for which there is a proper air supply is unburned, and even variations of smaller magnitude require the burning of more coal to produce a given amount of clinker.

In this connection, CO in the exit gases is not the only source of loss, as pure carbon can pass out of the stack or drop into the clinker if there is insufficient air to burn it completely. This condition is often evidenced by yellow flames in the rear kiln chamber and even out the top of the stack. Methods of testing for unburned carbon have been developed and proved practicable. Dust samples can be carefully collected from the gases leaving the kiln, and, by leaching these with acid, the carbonates can be removed and the remaining carbon can be determined in a combustion tube and proportioned to the weight of gases. Some tests that have been made indicate the carbon loss in the flue dust to be twice as much for a storage system as for direct firing.

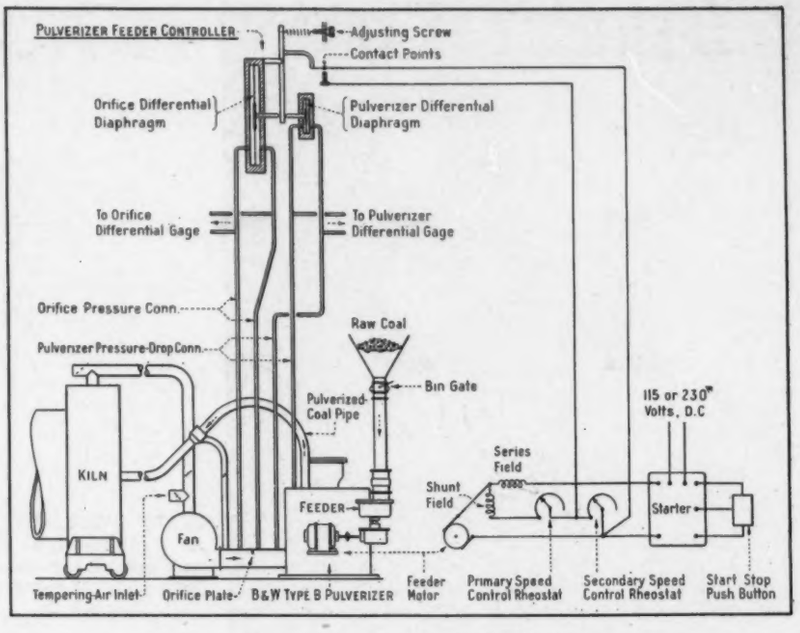


Fig. 3—Schematic diagram of automatic control system

Dispersion

In a direct-firing system the coal is uniformly dispersed in the primary air, and each individual particle is surrounded by air, ready to be ignited and to burn with a large amount of surface exposed. In a storage system the coal becomes deaërated and packed in the bin, and is still further compacted in the feeder, so that even when mixed with the primary air, it is never completely disintegrated, but is really fired in the form of clusters of particles, often termed "snowballing." These clusters coke together and are the equivalent of coarsely pulverized coal, which, if large enough, drop into the clinker and are lost, or are carried unburned out of the kiln with the gases.

Fineness

It has been found that a fineness of 80-85% through 200-mesh—with 99.5% through 50-mesh—is desirable for the best results, and the fact that these direct-firing pulverizers will produce that fineness throughout the life of the grinding elements is one of the reasons for their success. The heat in the clinkering zone is transmitted to the clinker largely by the radiation from the carbon particles, and is directly proportional to the surface of these particles. Thus, fine pulverization is desirable not only because it results in early stable ignition and complete combustion, but also because it increases the transfer of heat to the clinker.

Ignition

It has been found that ignition is earlier with direct firing than with storage firing, even though the fineness and air velocities are approximately the same. This is undoubtedly due to the better dispersion of the coal in the air. The experimental work of Bone, Newitt and Townsend, as published in their book, "Gaseous Combustion at High Temperatures," shows that the addition of moisture to gaseous fuels has a decided tendency to speed up the ignition, and it seems reasonable that it has a similar effect on the gases distilled from pulverized coal.

The factors controlling ignition are: temperature of air and coal, velocity of coal and air at the burner tip, and amount of air per pound of coal. In the lower part of Fig. 1 is shown the speed of ignition or flame propagation with various amounts of air per pound of coal. The maximum is reached at from 3 to 5 lb. of air per pound of coal. Many storage systems use one pound or less of air per pound of coal with resulting late and puffy ignition. The direct-firing pulverizers previously mentioned use about 3 lb. of air per pound of coal and give early ignition.

This larger amount of primary air is also necessary to properly dry very wet coal. In the upper part of Fig. 1 are shown the maximum permissible temperatures of primary air at the burner with varying quantities of air and with varying air velocities. For 3 lb. of primary air per pound of coal it is seen that the temperature of the air at the burner should not exceed 180 deg. F., and that the velocity should not be less than 7500 ft. per min. The limits given are those prevailing with one particular kiln, having a Unax cooler, and giving ignition close to the burner tip. The ignition can be allowed to draw away from the tip somewhat without becoming unstable; that is, velocities higher

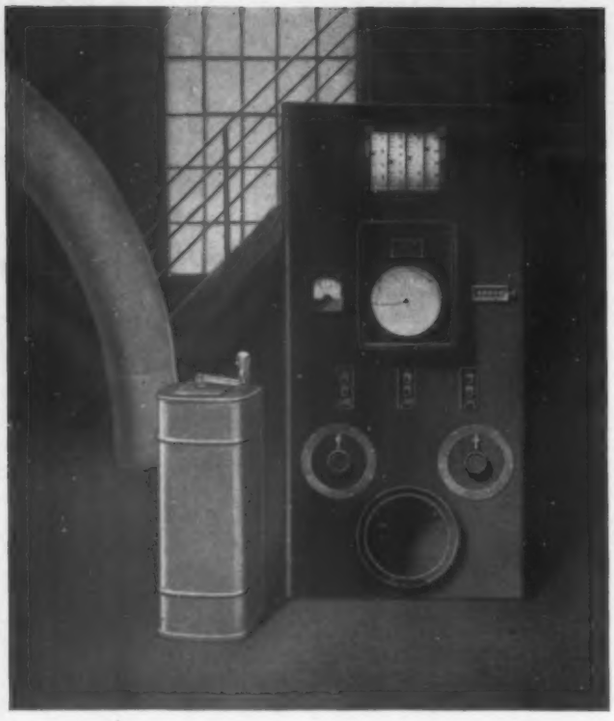


Fig. 4—A typical control panel for pulverizer and kiln

The control board contains the equipment considered essential for good operation of a kiln. The various meters are:

Multipointer gauge—Indicating:
- Kiln exit draft..... —0-1 in.
- Pulverizer differential .... —0-12 in.
- Pulverizer air flow..... —0-1½ in.
- Temperature leaving pulverizer ..... —0-300 deg.

Left—Pulverizer motor ammeter.
Center—Recorder on temp. of gases leaving kiln.
Right—Kiln revolution counter.
Pushbuttons for motors on pulverizer, fan, and kiln.
Primary and secondary rheostats for feeder motor.
Bottom—Pulverizer feeder controller.
Additional meters may be added

than 7500 ft. per min., and temperatures lower than 180 deg. F. can be used. Other types of kilns having shorter burners will permit lower velocities and higher air temperatures.

By-Pass

The fineness and quantity of coal withdrawn from a direct-firing pulverizer are controlled by the quantity of air used. This may not give the desired velocity at the burner tip, so a by-pass is provided around the pulverizer so that additional air can be introduced into the burner line as desired. The arrangements shown include this by-pass feature.

The earliest possible ignition that will not burn up the tip or result in undue maintenance of the kiln lining will give the most efficient operation, as it really results in increasing the effective length of the kiln.

Moisture

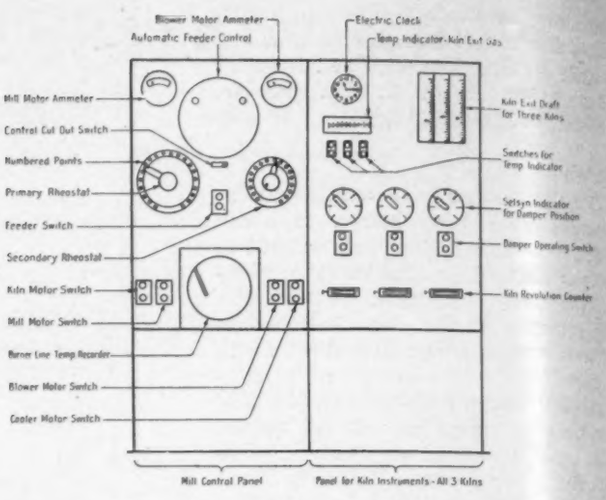
Doubt was expressed that kiln capacity and efficiency could be obtained when high moisture coals are used in direct firing. The best answer to that doubt is that Illinois coal having 19.8% moisture has been successfully fired, and the output and coal rate are better than were obtained with the storage system.

Heat Balances

Brief abstracts from five complete heat balances on direct-fired kilns are tabulated in Table 2. In test No. 1 a deliberate attempt was made to generate more steam, with the result that the pounds of coal and B.t.u. per bbl. are higher than usual. The B.t.u. per bbl. rates for tests Nos. 2 and 3 using high moisture Illinois coal, are quite creditable. A good indication of the accuracy of these tests and the uniformity of feed is given in the consistency of the radiation and unaccounted-for losses for tests Nos. 1, 2, and 3, which are 5.88, 5.04, and 4.07% respectively. The kiln used in tests Nos. 1, 2, and 3 is a dry-process kiln 100 ft. long, equipped with a Lee cooler. The kiln used in test No. 4 is a wet-process kiln, 280 ft. long, equipped with a rotary cooler. These differences should be kept in mind in comparing the B.t.u. rates and the radiation losses. The radiation losses would be expected to be higher with the longer kilns.

Coal Savings

Table 3 gives a brief tabulation of the coal saving made after the installation of direct firing in six plants. The savings for the two Dolomite installations are expressed as pounds per 100 lb. of product and are on a different basis than those for the cement kilns. The relative coal rates are, however, comparative. The Kelley Island plant used gas producers prior to the installation of direct firing.



UPPER RIGHT. Fig. 5—A very complete board installed at the Birmingham plant of Lone Star Cement Co.

Type of Coal

In general, the quality of coal required for direct firing a kiln is the same as that needed for storage systems. High moisture coals of fine size are difficult to handle in a rotary dryer but can be used successfully in a direct-firing system. At Cape Girardeau a very fine coal, practically all minus 50-mesh, is available at an appreciably lower cost and is used quite successfully. The only trouble encountered was in maintaining the flow from the bin when the coal was wet. This difficulty was overcome by constructing a jacket around the bin through which hot air from the Lee cooler is circulated.

Maintenance

Coals high in ash offer no special difficulty, and as shown by the heat balances given in Table 2, coals having 18 to 19% ash are used. In fact, at one time during the tests, the ash content was as high as 24.4%, but caused no difficulty. The sulphur content of the coal used on these tests was 4.3%. Where economical to do so, coals of this quality can be used, but it cannot be expected that maintenance on the pulverizer will be as low as is obtained with better grade Eastern coals.

Fig. 2 shows the approximate trend in the relation between the hours of life to be expected from pulverizer parts when pulverizing coal having various ash and sulphur contents. The values of hours of life are for present-day materials, and, as the materials are improved, the life of parts will be increased materially. This curve should be considered only as indicating a trend. The pyrites content, which is roughly indicated by the sulphur con-

TABLE 1—LIST OF DIRECT FIRED INSTALLATIONS

Plant and type of pulverizer	Location	Pulverizer No.	Pulverizer Size	Process	Kiln size in feet	Type of Cooler
Fuller Bonnot						
Pittsburgh Plate Glass Company	Zanesville, O.	2	No. 10	——	10x165	——
Union Carbide	Niagara Falls, N. Y.	1	No. 4	——	7x122	——
Union Carbide	Niagara Falls, N. Y.	2	No. 5	——	9x120	——
Valley Dolomite Co.	Granite City, Ill.	1	No. 4	——	8x110	——
Mathieson Alkali Works, Inc.	Saltville, Va.	2	No. 8	——	9½x295	——
B&W Type B						
North American Cement Corp.	Howes Cave, N. Y.	1	No. 138	Wet	10x175	Unax
Kelley Island Lime and Transport Co.	Clay Center, Ohio	1	No. 126	Dry	8x150	Rotary
Marquette Cement Manufacturing Co.	Oglesby, Ill.	8	No. 132	Dry	10x100	Lee
Marquette Cement Manufacturing Co.	Cape Girardeau, Mo.	2	No. 138	Dry	9x130	Lee
Marquette Cement Manufacturing Co.	Cape Girardeau, Mo.	1	No. 144	Dry	9x130	Lee
Basic Dolomite Corp.	Maple Grove, Ohio	3	No. 138	Semi-dry	10x150	Vanderwerp
Basic Dolomite Corp.	Maple Grove, Ohio	1	No. 111		5x160	Rotary
Lone Star Cement Corp.	Birmingham, Ala.	2	No. 138	Wet	10x280	Rotary
Canada Cement Co.	Hull, Quebec	1	No. 144	Wet	11x365	Unax
Ash Grove Lime and Portland Cement Co.	Louisville, Neb.	1	No. 138	Wet	11x260	Unax
Valley Dolomite Co.	Bonne Terre, Mo.	1	No. 121	Dry	7x125	Rotary
Wolverine Portland Cement Co.	Quincy, Mich.	1	No. 144	Wet	10x305	——
Spokane Portland Cement Co.	Spokane, Wash.	1	No. 124	Dry	8½x100	Lepol
Three Forks Portland Cement Co.	Trident, Mont.	2	No. 138	Dry	9½x150	Rotary
Peerless Portland Cement Co.	Detroit, Mich.	3	No. 144	Wet	11x175	——
Dolite Company	Toledo, Ohio	1	No. 132	——	——	——
Signal Mountain Portland Cement Co.	Chattanooga, Tenn.	2	No. 150	Wet	11x175	Rotary
Ash Grove Lime and Portland Cement Co.	Chanute, Kan.	4	No. 129	Wet	1-9x200 3-8x180	Rotary Vanderwerp
Pennsylvania-Dixie Cement Corp.	Des Moines, Iowa	2	No. 150	Wet	11x10x240	——
Lone Star Cement Corp.	Nazareth, Penn.	2	No. 144	Dry	11x175	Rotary
J. E. Baker Co.	York, Penn.	1	No. 124	Dry	8x125	Rotary
Dewey Portland Cement Co.	Davenport, Iowa	3	No. 150	Wet	11x175	Rotary
Universal Atlas Cement Co.	Leeds, Ala.	2	No. 138	Dry	——	——

tent, is the most troublesome factor in increasing wear of parts, but the abrasive character of the coal and ash particles also has a direct influence on wear. The fact that some coals cause 15 times as much wear as others proves rather conclusively that it is the coal and its impurities which wear out the grinding elements.

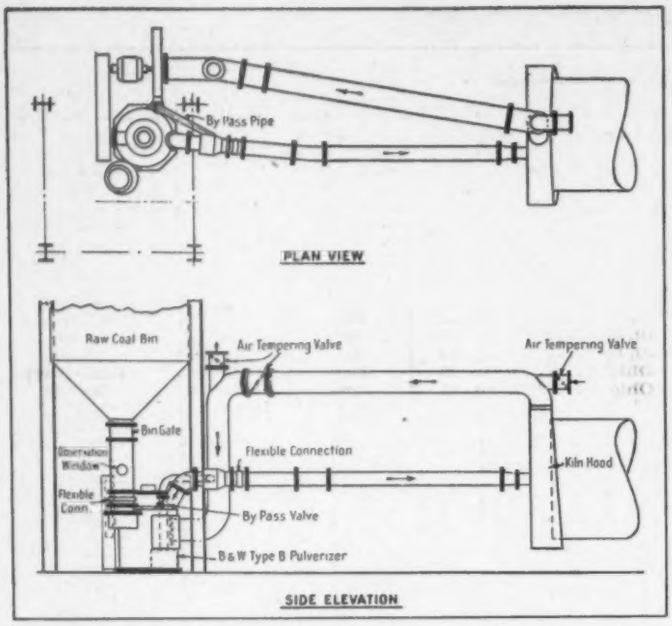
With grinding elements lasting from 4,000 to 40,000 hours, or more, depending on the coal, the cost per ton of output for these parts varies from 3.0 to 0.3c.

Some additional features of direct firing which are of interest are:

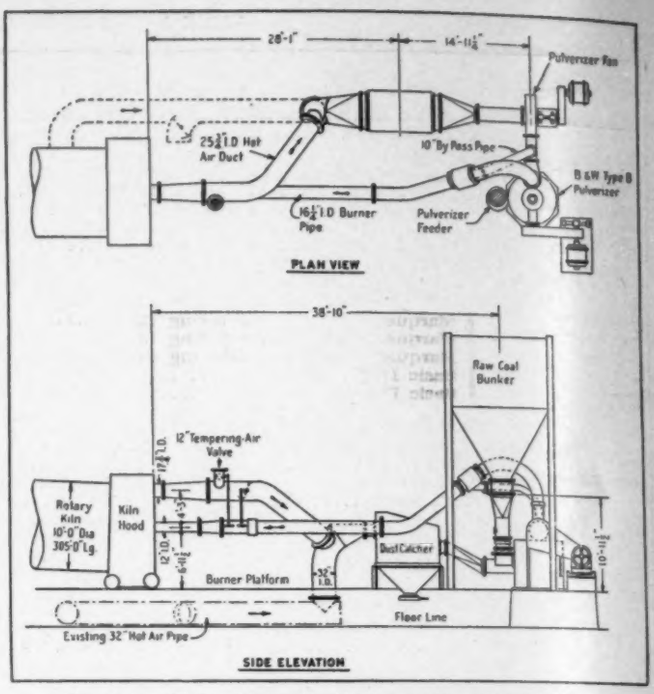
(1) Less trouble from rings in kilns, as the very close control of coal feed

TABLE 2—HEAT BALANCE TESTS

	Marquette, Oglesby Kiln No. 1			Lone Star, Birmingham	Basic Dolomite
Date	3-18-35	2-12-35	2-13-35	June, 1935	4-1-35
Duration, Hr.	49.6	24	24	30 Days	12 Hrs.
Kiln size	10x100	10x100	10x100	10x280	10x150
Barrels per hour	47.9	51.29	51.0	72.9	8.54 T
Coal, lb. per hour	5772	5340	5260	6656	6142
Coal, lb. per bbl.	120.3	104.21	103.34	91.3	53.94/100 lb.
Fineness of coal, % — 200-mesh	——	79.2	78.3	85.2	83.0
Million B.t.u. per bbl.	1.17	1.04	1.025	1.19	——
Primary air, per cent	25.5	36.4	38.3	——	——
Waste-heat steam, lb. per bbl.	433.2	278.6	265.7	——	——
Temperature of primary air	146	137	140	173	166
Temperature of secondary air	1023	1100	1160	1210	1375
Temperature of kiln exit	1860	1768	1763	646	1500
Temperature of stack	366	361	358	——	——
Temperature of air to pulverizer	450	400	400	——	273
Temperature of kiln front	2660	2815	2834	——	——
Coal Analysis					
Moisture	16.7	11.3	13.1	4.86	4.4
Ash	8.39	18.18	19.52	12.9	7.5
Sulphur	1.67	4.36		0.9	0.9
Volatile	34.23	37.33		29.1	35.9
B.t.u. as fired	9705	9974		13033	13317
Heat Input, per cent					
Fuel	81.14	82.69	82.21	83.68	84.78
Air	12.87	10.54	10.74	11.35	14.50
Exothermic	4.55	5.15	5.36	4.59	0.72
Raw feed	1.44	1.62	1.69	0.38	——
Heat output, per cent					
Calcination and dehydration	26.44	29.74	30.93	26.94	27.39
Dry waste gases	40.95	36.35	36.53	9.94	30.45
H_2O, Sensible, Latent, and Superheat	9.04	8.33	8.77	31.59	11.62
CO	0.36	1.69	0.04	0	0.22
Dust	2.01	1.49	1.55	0.15	0.42
Clinker	15.32	17.36	18.06	14.68	10.91
Radiation and Unacc't.	5.88	5.04	4.07	16.70	16.17
				Air leakage at hood	2.82



Arrangement at Bonne Terre, Mo., plant of Valley Dolomite Co.



Layout at Wolverine Portland Cement Co., Quincy, Mich.

permits the operator to run slightly reducing or slightly oxidizing at will.

(2) Freedom from any of the winter troubles, such as condensation and hang-ups in pulverized-coal bins.

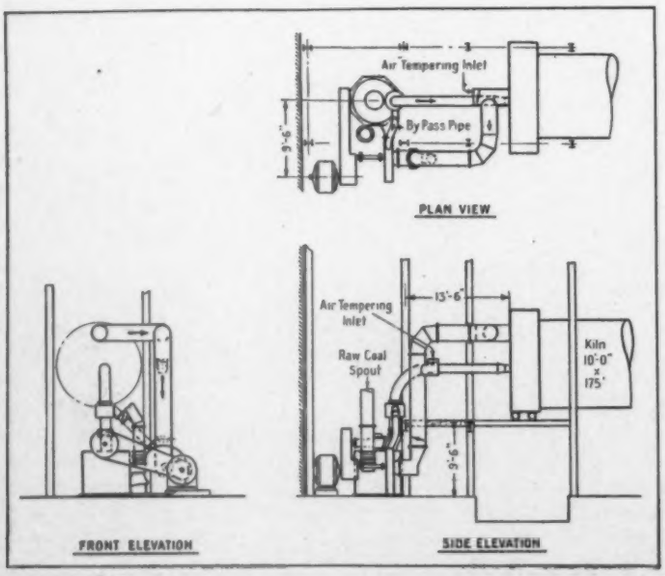
Pulverizer Feeder Control

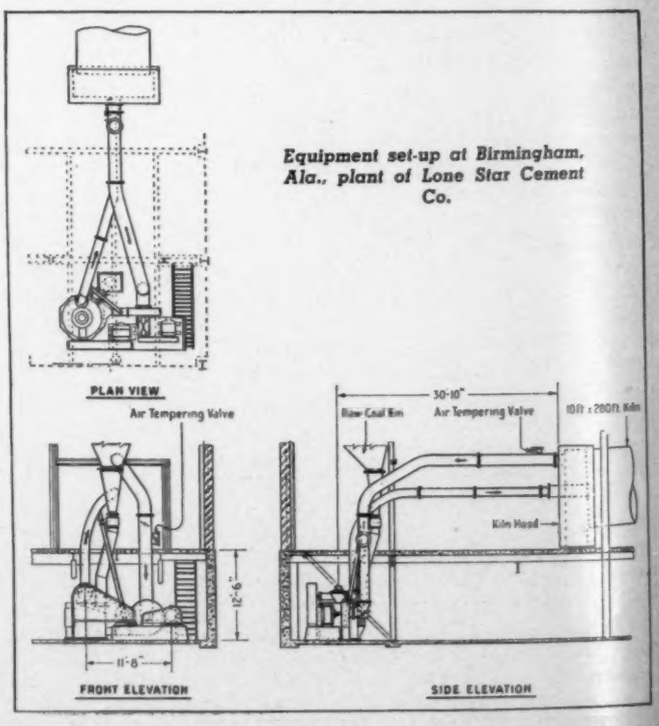
Raw coal is fundamentally much easier to feed evenly than pulverized coal, but combustion conditions in a kiln can, and should be, adjusted to such a nicety that feeding a constant volume of raw coal is not sufficient, as variation in moisture and sizing affect the heating value of a given volume of coal. Fig. 3 shows the pulverizer feeder controller that has proved to be very successful in delivering a remarkably uniform flow of coal to the kiln.

During two tests of 12 hours' duration at Basic Dolomite, the largest deviation in hourly weights was 8 lb., or 0.13 of 1%.

This controller maintains a definite ratio between the air flow, which is measured by an orifice in the clean air line, and the pressure drop through the pulverizer. This really means that a definite amount of coal is maintained in the pulverizer for a given air flow. If too much coal accumulates in the pulverizer, the pressure drop through the pulverizer increases. This unbalances the opposed diaphragms and closes an electrical contact that shunts out the secondary rheostat, thus reducing the speed of the d.-c. motor driving the feeder. When the coal level drops and the diaphragms become balanced, the contact opens. The feeder speed is thus varied between two points to maintain the desired coal levels in the pulverizer. Increases in the amount of coal delivered are obtained by increasing the air flow by means of a damper in the primary air line. This is the only adjustment necessary to vary the coal rate. The primary and secondary rheostats are adjusted to give feeder speeds well

BELOW: Installation on two kilns at Peerless Cement Corp., Detroit, Mich.





Equipment set-up at Birmingham, Ala., plant of Lone Star Cement Co.

TABLE 3—COAL SAVINGS BY DIRECT FIRING

	North American	Marquette, Oglesby	Lone Star, Birmingham	Marquette, Cape Girardeau	Kelley Island	Basic Dolomite
Lb. coal/bbl., storage system	121	134	105	130	——	——
Lb. coal/bbl., direct fired	111	115	91	125	——	——
Lb. coal/100 lb. material, storage	——	——	——	——	63	56
Lb. coal/100 lb. material, direct	——	——	——	——	48	38
Kiln output, bbl./hr., storage	40	——	68	——	60 T/Day	170 T/Day
Kiln output, bbl./hr., direct	40	51	72	54	80 T/Day	205
Size kiln	10x175	10x100	10x280	9x130	8x150	10x150
Process	Wet	Dry	Wet	Dry	Dry	Semiwet
Coolers	Unax.	Lee.	Rot.	Lee	Rot.	Vanderwerp

above and well below the operating range. Variations in voltage or motor temperature do not affect the accuracy of the control so long as the range is wide enough. Signal lights on the front of the controller indicate high-and-low speed operation, enabling the operator to tell by the frequency of the change in lights if the speed range is ample. The small diaphragm can be adjusted vertically to obtain the desired ratio for each installation, and the small spring can be varied to give the proper relation between air and coal at various outputs. When once adjusted, the ratio of coal to air will always be the same for a given rate of air flow, making it impossible to overload or choke the pulverizer. As increased coal output is obtained by increasing the air flow, the response to changing load is very rapid, a characteristic that is very desirable with fluctuating boiler loads but is not so necessary with kiln firing.

The installation at the Birmingham plant of Lone Star Cement Co. requires a coal feed of 7000 lb. per hour for standard cement, but, when burning Incor, 1800 lb. per hour is all that is needed. This control has functioned very satisfactorily on both rates.

For firing steam boilers, this control is used with a squirrel-cage, constant-speed, feeder-motor that is stopped and started as required. This arrangement gives even quicker response to fluctuations in load than the d.-c. motor, but the d.-c. motor varying through a much smaller speed range has seemed preferable for kiln firing where direct current is available. The dolomite kilns at Basic Dolomite, however, use a.-c. feeder motors very successfully, and it is not impossible to use them on cement kilns. In fact, the recent installation at the Wolverine Portland Cement Co. uses an a.-c. motor very satisfactorily.

Source of Hot Air

The primary air must be heated sufficiently to evaporate the surface moisture of the coal and still be safely above the dew-point. Usually the dew-point of the air leaving the pulverizer is reached at about 110 to 120 deg. F. and enough additional heat is supplied to maintain a temperature of 140 to 160 deg., which is still well below the ignition limit mentioned in the discussion of Fig. 1. With the air in sufficient quantity and at the proper temperature to accomplish drying of the coal, the capacity of the pulverizer and the fineness of its output are the same as when handling dry coal. The air quantity, which is about three pounds of air per pound of coal, is more than is used in some other types of direct-firing pulverizers and is one of the reasons why coal having moisture as high as 19.8% previously mentioned can be successfully handled. This large weight of air, even with the air cold at starting, has an appreciable drying effect and permits warming up a kiln more rapidly. Ordinarily, a temperature of 400 deg. F. for the air entering the pulverizer will be ample, but for Illinois coal, air at 500 deg. F. has been used to advantage. This hot air is most conveniently obtained from the kiln hood, where temperatures of around 1,200 deg. F. usually exist. Tempering air is admitted as required to maintain the air leaving the pulverizer at the desired temperature. The hot air has been taken from the top of the hood in some installations and from the front of the hood near the top on others. Probably the top location is to be preferred, as it is easier to disconnect the piping when necessary to move the hood and there may be less grit drawn into the fan with the air. Where Lee coolers are used, the hot air is taken from the duct between the cooler and the burner. Dust collectors or settling chambers have been installed at Marquette and Wolverine. At the Lone Star plant at Nazareth, a jacket is being placed around the hot end of the rotary cooler from which the hot air is drawn.

Summary

The application of direct firing to cement kilns is fundamentally economical, as has been proved by the results obtained with these installations. Much as a good pulverizer is a necessary part of direct-firing installations, that alone is not enough. There must be accurate control of feed, proper quantities of hot air, provision for the right burner velocities without impairing the fineness, and finally, but perhaps the most important, availability of skilled initial supervision by engineers who do more than adjust the equipment and instruct the operators, and who are capable of making the necessary tests to secure the best over-all results from the kiln, waste-heat boilers, and related equipment.

No small part of the success of direct firing of kilns is due to its being a coördinated system instead of an article of merchandise sold over the counter.

Hauling Unit

HUG Co., Highland, Ill., announces a new Model 30 Hug "Lugger." The engine is the Caterpillar D8800 Diesel, 4-cycle, water-cooled, with a displacement of 831 cu. in. and A.M.A. rating of 52.9. Transmission provides 12 speeds forward and three reverse.

Innovations in design and construction are incorporated in the chassis.

Diesel-powered hauling unit

The entire frame is electrically arc welded. Trusses, spring hangers, motor hangers, radius rod braces and box section cross members are all electrically arc welded to the side rails forming one rigid structure.

The body is the "scoop end," with direct reversible high dumping angle hoist. There is no tail gate and the body sides are reinforced with I-beam steel ribs. Body is of 10 cu. yd. capacity and the maximum pay load of the unit is 30,000 lb.

Draglines

KOEHRING Co., Milwaukee, Wis., announces a new series of dragline, Models 702 and 802, designed particularly for a wide range of operating flexibility, with economy of operation and low upkeep cost. Long booms, greater stability and extra wide and long crawlers are features as well as a special swiveling boom point fairlead.

NEW MACHINERY AND EQUIPMENT

Dust Counter

DUST CONCENTRATION in the air breathed is of major importance in determining whether employes are subjected to a silicosis or other dust disease hazard. This determination of dust concentration has been a technical engineering problem involving the use of special apparatus.

Device for dust count

With the collaboration of an insurance company, Bausch & Lomb Optical Co., Rochester, N. Y., has developed a dust counter which, it is claimed, will enable dust counts to be made easily and accurately without extensive laboratory training or experience by the operator. A foreman, engineer or chemist can be relied upon for accurate results. This instrument combines in one unit an air sampling device and dark field microscope viewing and counting system, mounted on a circular base, provided with illuminating apparatus and suitably cased for transportation or storage.

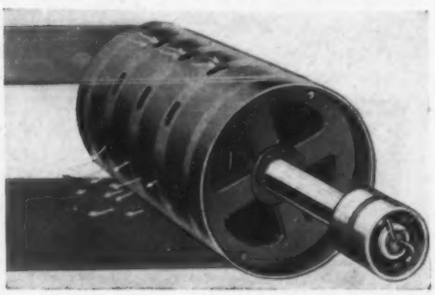
In this instrument a sample of air is drawn through a moistening chamber by means of an accurately calibrated hand pump of 1/1000 cu. ft. capacity. The dust particles suspended in the air are impinged on a circular glass plate within the instrument. The dust deposit is in the form of a ribbon. Twelve samples may be collected on one slide. These samples may be viewed and counted at once without removal, and they may be preserved for future reference by simply sealing a cover glass to the slide.

The viewing and counting apparatus consists of a built-in compound microscope of 200X magnification with a special dark field illuminating system. The special hyperplane eyepiece contains a micrometer disc ruled in 30 micron squares. An extra line, ruled next to the squares, permits approximate measurement of particles for classification as to size. The apparatus is so calibrated that by multiplying the number of dust particles in the square fields by 100,000 the total dust count per cubic foot of air is secured.

Magnetic Pulley

STEARNS MAGNETIC MANUFACTURING Co., Milwaukee, Wis., announces a magnetic pulley which utilizes the operating action of the conveyor belt for an unusual type of radiating ventilation which serves to reduce the heat around the coils, thereby producing a more powerful pull and sustained efficiency in prolonged action, according to R. H. "Ross" Stearns, president of the company. Through a system of specially designed air ducts, the air is forced into the radiating areas of the pulley by the upper belt and in turn is sucked out by the action of the return belt. This provides a continuous circulation of fresh air through the pulley.

By this design the pulley is claimed to exert from 25 to 50% more magnetic pull in pounds per square inch. The pulley castings are one piece and are annealed to insure maximum permeability. The pole or flanges of the coil sections are sloped toward the core, giving increased area and consequent greater flux density or magnetic strength at the face of the pulley.



High-duty magnetic pulley

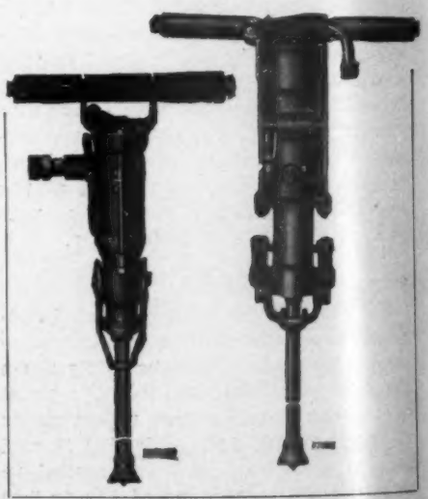
Oil Burner

PHILADELPHIA DRYING MACHINERY Co., Philadelphia, Penn., markets industrial oil burners for dryers and kilns which represent 20 years' experience in design and manufacture. These burners feature low pressure venturi atomization. Due to the design of the air passages, the oil is induced into the air stream by suction, the mixture of air and oil being compressed in the venturi tube and rapidly released at the discharge end of the venturi, bringing about atomization within the burner, instead of in the furnace chamber. This produces rapid combustion in a small space, but delayed combustion can be produced at will.

Oil burner with low pressure venturi atomization

Percussion Drills

INGERSOLL-RAND Co., Phillipsburg, N. J., announces two new Jackhamers the JA-30 and the JA-45. The JA-30 dry drill weighs 30 lb. and is 19½ in. long; the wet drill weighs 32 lb. It has a new principle of rotation and a new valve, as compared with the older Jackhamers. The JA-45 is similarly built, weighs 45 lb. and is 21 in. long. It is furnished in dry, wet and blower types. Both new drills are said to require less air for operation than older styles. A portable air compressor now operating two 55-lb. drills would operate three new 45's, it is said.



Drills requiring less air for operation

THE INDUSTRY

New Incorporations

Curtis Fluorspar Corp., Salem, Ky.; $10,000. Incorporators are J. R. Finkelstein and C. Curtis Steen.

Ohio County Lime and Rock Co., Hartford, Ky. Incorporators are Ira Daugherty and W. H. Dunn.

Gastonia Quarries, Inc., Gastonia, N. C.; capital, $25,000. Incorporators are John O. Gaither, Gastonia, and V. S. Hall, Charlotte.

Crittenden Limestone Co., Marion, Ky.; $5000. Incorporators are Samual Gugenheim, George P. Roberts, C. R. Easley and C. H. Stewart.

Gulf Portland Cement Co., Fort Worth, Texas; capital stock, $1000. Incorporators are Harper Holt, Harry Brelsford and Jessica Beeson.

Carolina Granite Co., Inc., Greensboro, N. C.; capital, $50,000. Incorporators are J. W. Inman, L. M. Kerans, Jr., and Luna K. Hames.

Helark Concrete Products Manufacturing Co., Inc., Wilmington, Del.; $10,000. Incorporators are M. M. Lucey, A. E. Ross and L. S. Dorsey.

Volco Cement Corp. (Delaware), American National Bldg., Oklahoma City, Okla.; capital in Oklahoma, $20,000. Ned Looney is service agent.

Panama Concrete Products Co., Panama City, Fla. Incorporators are William Paxton and B. E. Melton.

Keylarge Stone Quarries, Inc., Coral Gables, Fla.; to deal in stone; 100 shares, no par value. Incorporators are D. W. Dyer, H. Reinhart and A. Brown.

United Foundry Sand Co., Cranston, R. I.; sand, gravel, trucking, excavating; capital, 100 shares common, no par value. Incorporators are Americo Caparrelli, Maria G. Caparrelli, Dominico Cardi and Rosa Cardi.

National Gypsum Co., a Delaware corporation, authorized to do business in Virginia. Maximum authorized capital stock was increased from $6,710,000 to $8,035,000. Eppa Hunton, IV, Richmond, Va., is the attorney.

Personals

Clyde Turner is the new assistant superintendent of Snake Butte quarry, Harlem, Mont.

Edward E. Evans, vice-president of the Whitehouse Stone Co., Toledo, Ohio, is a candidate for the office of clerk of courts on the Republican ticket.

Carl Smith, Tenino, Wash., an employe of Columbia Construction Co., was bruised in the quarry rock slide September 22 which fatally injured Carl Johnson.

E. W. Koenig, chemist with the Erwin Feldspar Co. plant, Erwin, Tenn., was severely burned early in October at Keystone, S. D., where he was assigned for special duty.

W. A. Brooks has been appointed sales manager of the Alpha Portland Cement Co. plant at Ironton, Ohio, to succeed the late James R. Paul. **Smith Progler** has been promoted to office manager.

William J. Reardon of the Reardon Cement Co., Cincinnati, Ohio, and Chicago, Ill., has been appointed by the Cincinnati Chamber of Commerce as a delegate to the navigation deliberations of the Ohio Valley Improvement Association at Huntington, W. Va., November 10.

Albert H. Atkinson, Port Jefferson, N. Y., has resigned his position as general manager of the Colonial Sand and Stone Co. and has gone into the contracting and general trucking business on a large scale. Mr. Atkinson came to Port Jefferson six years ago as traffic manager for the Great Eastern Gravel Corp. He bought out this concern in 1934 and then sold his interests to the Colonial Sand and Stone Co. in 1935.

Obituaries

Robert Carr Churchill, 45, president of the R. C. Churchill Concrete Co., Roanoke, Va., died September 9 after a 2-years' illness.

M. G. Roll, 87, a director of the Monarch Cement Co., Humboldt, Kan., died in Wichita, Kan., October 13. He was one of the largest holders of the company's stock.

Rhodes Browne, 71, civic leader of Columbus, Ga., and former president of the Bull Creek Sand and Gravel Co., died October 8 after a week's illness.

Carl Johnson, 53, a foreman at Columbia Construction Co., Portland, Ore., died September 22 of injuries received in a rock slide caused by blasting at the quarry near Rainier.

Marshall Emory Stephenson, 47, chief electrician for the Monarch Cement Co., Humboldt, Kan., died September 24 as a result of injuries received when he touched a 440-volt line at work a few days before. He had been with Monarch for 17 years.

Donald H. Johnson, 49, former vice-president of the Indiana Limestone Corp. and for 25 years a prominent figure in the Indiana limestone industry, died September 19 at his home near Mitchell, Ind., of coronary thrombosis. Joining the former Consolidated Stone Co. at Bedford, Ind., about 25 years ago, he became connected with the sales department of the Indiana Limestone Corp. in 1926. He resigned from the firm last January.

YOU CAN'T REPLACE A HEAD —BUT YOU CAN *PROTECT* ONE

McDonald Safety Hat not affected by weather. Permanently retains its exact size and shape.

Safety Hat of DURALUMIN Lessens Head Injuries

For the first time, Davis can offer complete head protection to men working even under the most hazardous conditions. Where a severe blow would puncture an ordinary, rigid hat, the new McDonald Safety Hat of tough, blow-resisting Duralumin metal withstands and cushions severe shocks.

You can save painful injuries as well as lives formerly lost. Minimize your compensation with this new safety helmet. Allow your men to work more confidently, skilfully, knowing that when they wear a McDonald Safety Hat they are completely protected.

Six distinct features of this new Safety Hat bearing on comfort, "wearability", etc., will interest you. Send now for a copy of the bulletin completely describing them. The coupon is for your convenience.

DAVIS PRODUCTS: First Aid Supplies (Tannoid for burns, Isodine—the newer antiseptic) . . . Gas Masks . . . Lineman's Safety Equipment . . . Gas Indicators . . . Protective Clothing . . . Goggles.

DAVIS EMERGENCY EQUIPMENT CO., INC.
Chicago, Ill. • New York City • Houston, Tex.
San Francisco and Los Angeles, Cal.

Davis Emergency Equipment Co., Inc.
55 Van Dam Street, New York City

Please send my copy of your Bulletin on McDonald Safety Hat to

Name_____

Address_____

City_____ R.P.2

Charles Alexander Fox, 67, former vice-president of the Felix Sand and Gravel Co., died at his home in New York, N. Y., October 16 after an illness of four months.

Mrs. Amelia B. Schultz, 40, secretary and manager of Zeidler Concrete Products Machinery Co., Waterloo, Iowa, died October 24 as a result of infection which followed extraction of four teeth. She was the widow of Alfred W. Schultz, manager and treasurer of the company, who was killed May 7, 1935, when his automobile overturned.

Alex S. Sorensen, 55, president of Atwood-Davis Sand Co. and also of the Illinois-Wisconsin Concrete Pipe and Tile Co., Chicago, Ill., died October 31. He had been associated with the Atwood-Davis Sand Co., for 30 years, having served as treasurer and as secretary earlier in his career.

George K. Smith, 73, chairman of the board of the Albany Gravel Co., Inc., and also an associate in the Ready Mix and Supply Corp. of Albany, died suddenly of heart disease while visiting in the office of the Lehigh Portland Cement Co., at New York, N. Y., September 30. Mr. Smith had come from Albany, N. Y., to see the World Series games. Earlier in his life Mr. Smith was sales manager of Good Roads Machinery Co. and of Climax Road Machinery Co. He assisted in the founding of the Albany Gravel Co. in 1922.

James R. Paul, sales manager of Alpha Portland Cement Co. plant at Ironton, Ohio, died suddenly early in October of a heart attack.

Dr. Samuel Montgomery Kintner, 64, vice-president in charge of engineering of Westinghouse Electric and Manufacturing Co., died at his home in Pittsburgh, Penn., September 28. He was widely known for his research work in the development of radio communication and broadcasting.

Crushed Stone

Linn county soil conservation service, Brookfield, Mo., has leased four quarries to produce agricultural limestone.

Shelby county authorities, Shelbyville, Mo., recently purchased a new rock crusher for WPA road work.

Fort Madison, Iowa: Reports state that $31,000 of WPA funds have been made available for resumption of quarry operations in Marion township and Sandusky for surfacing secondary roads in Lee county. M. F. McFarland is county engineer.

Henderson Bros., Richmond, Mo., are installing a new and larger crusher at their plant five miles west of town.

Jefferson county soil conservation association, Fairfield, Iowa, has ceased quarry operations for the winter season.

Cole county soil conservation association, Jefferson City, Mo., ceased quarry operations November 1 for the winter season.

Hume, Mo.: Howard township board has purchased a new rock crusher for its WPA project.

El Paso, Texas, county and city authorities and the El Paso water department plan to operate a joint quarry in McKelligon canyon. Ashley G. Classen, superintendent of water works, is in charge of the project.

Cedar Falls, Iowa: Black Hawk county authorities recently established a quarry and crushing plant for highway work.

(Continued on Page 77)

Statement of the Ownership, Management, Circulation, Etc., Required by the Act of Congress of March 3, 1933.

Of Rock Products, published monthly at Chicago, Illinois, for October 1, 1936.

State of Illinois, County of Cook, ss.

Before me, a notary public in and for the State and county aforesaid, personally appeared Geo. C. Williams, who, having been duly sworn according to law, deposes and says that he is the business manager of the Rock Products and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher — Tradepress Publishing Corporation, 205 W. Wacker Drive, Chicago, Ill.

Editor—Nathan C. Rockwood, 205 W. Wacker Drive, Chicago, Ill.

Managing Editor—None.

Business Manager—George C. Williams, 205 W. Wacker Drive, Chicago, Ill.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

Tradepress Publishing Corporation, 205 W. Wacker Drive, Chicago, Ill.

Nathan C. Rockwood, 219 N. Columbia St., Naperville, Ill.

Julius L. Frazier, 2043 Orrington Ave., Evanston, Ill.

Horace T. Hunter, 120 Inglewood Drive, Toronto, Canada.

Inland Printer Company, 205 W. Wacker Drive, Chicago, Ill.

Julius L. Frazier, 2043 Orrington Ave., Evanston, Ill.

M. E. Johnston, 4134 Berkeley Ave., Chicago, Ill.

Col. J. B. Maclean, 7 Austin Terrace, Toronto, Canada.

Horace T. Hunter, 120 Inglewood Drive, Toronto, Canada.

Herbert V. Tyrrell, 221 Dunvegan Road, Toronto, Canada.

MacLean Publishing Company, 481 University Ave., Toronto, 2, Canada.

Col. J. B. Maclean, 7 Austin Terrace, Toronto, Canada.

Horace T. Hunter, 120 Inglewood Drive, Toronto, Canada.

Herbert V. Tyrrell, 221 Dunvegan Road, Toronto, Canada.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)

None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is: (This information is required from daily publications only.)

GEO. C. WILLIAMS,
Business Manager.

Sworn to and subscribed before me this 19th day of October, 1936.

(Seal) FLORENCE L. PRINCE.

(My commission expires May 14, 1940)

BACON FARREL CRUSHERS

Complete Plants Designed and Equipped. Screens, Elevators, Conveyors, Quarry, Sand and Gravel Plant Equipment. Engineering Service.

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IF it's SERVICE you want to buy with your belt conveyor DOLLARS, come to HAISS. You'll get more for your money—more in yardage handled, more in years of service AND A MUCH LOWER BILL FOR UPKEEP. . . . Phone, wire or write for prices. Name your size.

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Who, for over 40 years, have created and sold none but equipment of demonstrable superiority in design and manufacture.

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SEPARATORS IN CEMENT PLANTS

Note the increase since the last appearance of our announcement. Operators everywhere recognize the big advantages of HIGH EARLY STRENGTH and they know that STURTEVANT AIR SEPARATORS produce it. These highly efficient air separators bring about Lower Temperatures — Specific Surface Area — Particle Size Control — Quality Cements — Lower Production Costs — Increased Tonnage. STURTEVANT Air Separators increase mill capacities 25% to 50% and separate to any fineness from 30 mesh to micron sizes.

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KOEHRING

Two new KOEHRING *Long Range* DRAGLINE models for large drainage projects, extensive stripping areas in mines and quarries and wide canal excavation. The 702 and 802 are especially designed for a long and wide range of operating flexibility. High speed further enables these machines to greatly increase production every day. *Know more about these Long Range Draglines! Ask for your copy of the new bulletin today!*

KOEHRING COMPANY
3026 WEST CONCORDIA AVENUE, MILWAUKEE, WISCONSIN

(Continued from Page 74)

A. K. Verrips has opened a quarry on the Des Moines river four miles south of Pella, Iowa, for the production of agricultural limestone.

Cooper county authorities, Boonville, Mo., have reopened four quarries which were temporarily closed October 1 because appropriations had been used up. Agricultural limestone is being sold to farmers.

La Crosse, Wis.: A new WPA quarry for production of agricultural limestone was opened early in October in Shelby, about 10 miles east of La Crosse, on Highway 33.

Peerless Stone Co., Nowata, Okla., has installed a larger rock crusher at its quarry on the Union Traction Co. north of Lenapah; also a new elevator and a bin.

Edward Glascock and Vol Matson, New London, Mo., have purchased a new rock crusher for the limestone quarry on the M. P. Myers property.

Sam Morrone, Lee's Summit, Mo., has established a rock crushing plant on his farm 2½ miles northwest of town to supply commercial crushed stone.

Sand and Gravel

Page county board of supervisors, Shenandoah, Iowa, has opened a gravel pit on the Alex Skinner farm to supply gravel for local street improvements.

Hamilton, Mo., has opened a gravel pit on the R. P. Duston farm for supplying material for city street improvement.

Manufacturers

Atlas Powder Co., Wilmington, Del., has purchased a large tract of land near Wilmington and will soon start construction of a plant for manufacture of industrial chemicals.

The Electric Welding Section of the National Electrical Manufacturers Association has established development headquarters in the Frick Bldg., Pittsburgh, Penn. A coöperative program is being initiated to investigate the electric welding market and determine the possibilities of extending it. H. S. Card, formerly editor of "The Welding Engineer" and author of "The Welding Industry", is in charge.

Smith Engineering Works, Milwaukee, Wis., announces that its Boston representative, the **Anderson Engineering Co.**, has moved its offices to 81-83 Binney Street, Cambridge, Mass.

Babcock & Wilcox Tube Co., Beaver Falls, Penn., announces changes in its southwestern representation: H. S. Dershimer has been appointed district sales manager at Tulsa, Okla., with offices in the Philtower Bldg. Reid R. Lumsden will serve Dallas territory at 728 Wilson Bldg., Dallas, Texas; and O. E. Berg is in charge of the office at 1007 Electric Bldg., Houston, Texas.

Linde Air Products Co., New York, N. Y., announces opening of a new district office at 2 Virginia St., Charleston, W. Va. A. R. O'Neal has been appointed district manager.

Chain Belt Co., Milwaukee, Wis., announces new location of the Portland, Ore., office, which has been moved to 112-118 S. W. 1st Ave.

Easton Car & Construction Co., Easton, Penn., announces recent appointment of H. B. Fuller Equipment Co. as agents in the Cleveland, Ohio, territory. H. B. Fuller and G. S. Crego, principals in the agency, have long been identified with quarrying and construction in northern Ohio.

Geo. P. Reintjes Co., Kansas City, Mo., has appointed **Moorlane Co.**, 409-11 East Archer St., Tulsa, Okla., as a sales representative.

Nordberg Manufacturing Co., Milwaukee, Wis., announces appointment of Harry Buckenheu as sales engineer in the eastern territory, with headquarters at 2901 Harrison St., Wilmington, Del.

Chicago Pneumatic Tool Co., New York, N. Y., announces promotion of W. C. Straub to assistant to executive vice-president. A. D. Stem replaces Mr. Straub as manager of the New York branch office.

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Airveyor
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Air Compressors
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Traylor Engr. & Mfg. Co.

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Bearings
Link-Belt Co.
Joseph T. Ryerson & Son, Inc.
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Timken Roller Bearing Co.

Bearings (Anti-Friction)
SKF Industries, Inc.
Timken Roller Bearing Co.

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Bearings (Thrust)
SKF Industries, Inc.
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Belt Fasteners
Flexible Steel Lacing Co.

Belt Lacing (Steel)
Flexible Steel Lacing Co.

Belting
Hewitt Rubber Corp.

Belting (Elevator and Conveyor)
B. F. Goodrich Co.
Hewitt Rubber Corp.

Belting (Metal, Conveyor, High and Low Temperature)
Wickwire Spencer Steel Co.

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Belting (V Type)
B. F. Goodrich Co.

Bin Gates
Fuller Co.
Link-Belt Co.
Sprout, Waldron & Co., Inc.
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Universal Road Machy. Co.

Bins
Traylor Engr. & Mfg. Co.
Universal Road Machy. Co.

Blasting Cap Protectors
B. F. Goodrich Co.

Blasting Machines
Atlas Powder Co.

Blasting Supplies
Atlas Powder Co.

Blasting Powder (See Powder, Blasting)

Blocks (Pillow, Roller Bearing)
Link-Belt Co.
SKF Industries, Inc.
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American Manganese Steel Co.

Bodies (Car & Motor Truck)
Easton Car & Construction Co.

Boilers
Babcock & Wilcox Co.
Combustion Engineering Corp.

Boots and Shoes
B. F. Goodrich Co.

Brakes (Magnetic)
Stearns Magnetic Mfg. Co.

Breakers (Primary)
Smith Engineering Works
Williams Patent Crusher & Pulv. Co.

Bucket Dumps
Dempster Bros., Inc.

Buckets (Clamshell, Grab, Orange Peel, etc.)
Geo. Haiss Mfg. Co., Inc.
Hayward Company
Link-Belt Co.
Owen Bucket Co.

Buckets (Dragline and Slackline)
American Manganese Steel Co.
Bucyrus-Erie Co.
Owen Bucket Co.
Page Engineering Co.
Wellman Engineering Co. (G. H. Williams)

Buckets (Dredging and Excavating)
Owen Bucket Co.

Buckets (Elevator and Conveyor)
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Bulldozers
Koehring Co.

Cableways
Broderick & Bascom Rope Co.
General Electric Co.
Link-Belt Co.
Macwhyte Company
Wellman Engineering Co. (G. H. Williams)
Williamsport Wire Rope Co.

Calcinators
Bradley Pulverizer Co.

Calcining Kettles (Gypsum)
J. B. Ehrsam & Sons Mfg. Co.

Cap Crimpers and Fuse Cutters
Ensign-Bickford Co.

Caps (Blasting)
Atlas Powder Co.

Car Pullers
Link-Belt Co.

Cars (Quarry & Gravel Pit)
Easton Car & Construction Co.

Castings
Babcock & Wilcox Co.
Cement Mill Equipment Co. (Grey Iron)
Eagle Iron Works (Grey Iron)
Link-Belt Co.
Timken Roller Bearing Co.

Cement Making Machinery
F. L. Smidth & Co.

Cement Process
Cement Process Corp.

Cement Pumps
Fuller Co.
F. L. Smidth & Co.

Chain (Dredge and Steam Shovel)
Bucyrus-Erie Co.
Jeffrey Mfg. Co.

Chain (Elevating and Conveying)
American Manganese Steel Co.
Chain Belt Co.
Link-Belt Co.

Chain Elevating and Conveying Equipment
Cement Mill Equipment Co.

Chain Systems (Kilns)
F. L. Smidth & Co.

Chute or Launder Lining
B. F. Goodrich Co.

Chutes and Chute Liners
American Manganese Steel Co.

Classifiers
Allen Cone & Machy. Corp.
Hardinge Co., Inc.
Link-Belt Co.

Clay Working Machinery
Bonnot Company

Clips (Wire Rope)
Broderick & Bascom Rope Co.
Macwhyte Company
Williamsport Wire Rope Co.

Clutches (Magnetic)
Stearns Magnetic Mfg. Co.

Coal Crushers and Rolls
Williams Patent Crusher & Pulv. Co.

Coal Pulverizing Equipment
Babcock & Wilcox Co.
Bonnot Company
Bradley Pulverizer Co.
Gruendler Crusher & Pulv. Co.
Pennsylvania Crusher Co.
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.
Williams Patent Crusher & Pulv. Co.

Compressed Air Hoists
Gardner-Denver Co.

Compressed Air Rock Drills
Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
Gardner-Denver Co.

Compressors (See Air Compressors)

Concrete Pipe Machinery
Universal Concrete Pipe Co.

Concrete Slab Raising Equipment (Mud-Jack)
Koehring Co.

Conveyor Belting (See Belting)

Conveyor Idlers and Rolls
C. O. Bartlett & Snow Co.
Link-Belt Co.

Conveyors and Elevators
Earle C. Bacon, Inc.
Chain Belt Co.
Fuller Company
Jeffrey Mfg. Co. (Vibrating)
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
Robins Conveying Belt Co.
F. L. Smidth & Co.
Smith Engineering Works
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Universal Road Machy Co.

Conveyors (Pneumatic)
Fuller Company

Conveyors (Screw)
Link-Belt Co.

Coolers (See Kilns and Coolers, Rotary)

Correcting Basins
F. L. Smidth & Co.

Couplings (Air Hose)
Cleveland Rock Drill Co.

Couplings (Flexible and Shaft)
Link-Belt Co.

Couplings (Hose, Pipe, etc.)
B. F. Goodrich Co.

Cranes (Air Powered)
Curtis Pneumatic Machy. Co.
Hewitt Rubber Corp.

Cranes (Clamshell)
Bucyrus-Erie Co.
Koehring Co.

Cranes (Crawler and Locomotive)
Bucyrus-Erie Co.
Koehring Co.
Link-Belt Co.
Michigan Power Shovel Co.
Northwest Engineering Co.

Cranes (Excavator)
Koehring Co.

Crusher Parts
American Manganese Steel Co.
Pennsylvania Crusher Co.

Crushers (Hammer)
C. O. Bartlett & Snow Co.
Dixie Machy. Mfg. Co.
Gruendler Crusher & Pulv. Co.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Sturtevant Mill Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Jaw and Gyratory)
Allis-Chalmers Mfg. Co.
Earle C. Bacon, Inc.
Birdsboro Steel Foundry & Mach. Co.
C. G. Buchanan Co., Inc.
Gruendler Crusher & Pulv. Co.
Jeffrey Mfg. Co.
Lewistown Fdy. & Mach. Co. (Jaw)
Nordberg Mfg. Co.
Pennsylvania Crusher Co.
Smith Engineering Works
Traylor Engr. & Mfg. Co.
Universal Road Machy. Co.

Crushers (Reduction)
Bonnot Company
Jeffrey Mfg. Co.

FLEET OPERATORS HAVE PROVED IT!

Just one of the many steps Gulf Scientists take to insure the high service value of *Gulfpride Oil*

An 8-cylinder automotive engine on the test dynamometer to determine the wear-life, horsepower output, carbon formation and friction losses due to differences in characteristics of motor oils.

OPERATING COST FIGURES prove that it's far cheaper to use *Gulfpride* . . the World's finest Motor Oil (100% Pure Pennsylvania)

Gulfpride is the only motor oil in the world refined by the "Alchlor Process." This famous process *literally* starts where others leave off. By removing the trouble-making impurities left in motor oil by less effective refining methods, the Alchlor Process produces an oil which has no equal.

Trucks and commercial cars operate with far less expense when Gulfpride is used. Here is a typical statement—from a man in charge of a large fleet of trucks: "Our maintenance costs this year—with Gulfpride in service—have been less than half our former costs. We seldom need to add oil to any of our trucks between drains—which are less frequent than before. Gulfpride has *more than paid for itself* in our equipment."

You can afford to use Gulfpride Oil—because it costs less to use! More per gallon—but less per mile.

GULF OIL CORPORATION
GULF REFINING COMPANY

GULF

GENERAL OFFICES, GULF BUILDING, PITTSBURGH, PA.

Classified Directory—*Continued*

Crushers (Roll)
Gruendler Crusher & Pulv. Co.

Crushers (Rotary)
J. B. Ehrsam & Sons Mfg. Co.

Crushers (Single Roll)
Gruendler Crusher & Pulv. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.

Crushing Rolls
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Birdsboro Steel Foundry & Mach. Co.
C. G. Buchanan Co., Inc.
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.

Cupolas (Rock Wool)
Whiting Corp.

Detonators
Atlas Powder Co.

Diaphragms (Pump)
B. F. Goodrich Co.

Dippers (Manganese Steel)
American Manganese Steel Co.

Dippers and Teeth (Steam Shovel)
American Manganese Steel Co.
Bucyrus-Erie Co.
The Frog, Switch & Mfg. Co.

Dirt Moving Equipt. (Dumptor)
Koehring Co.

Ditchers
Bucyrus-Erie Co.

Draglines
Bucyrus-Erie Co.
Link-Belt Co.
Northwest Engineering Co.
Page Engineering Co.

Draglines (Gasoline or Electric)
Koehring Co.

Dragline Cableway Excavators
Bucyrus-Erie Co.
Link-Belt Co.
Sauerman Bros., Inc.

Dragline Excavators
Bucyrus-Erie Co.
Michigan Power Shovel Co.
Northwest Engineering Co.
Page Engineering Co.

Dredge Pumps (See Pumps, Dredging)

Dredges
Bucyrus-Erie Co.
Hayward Co.
Hetherington & Berner, Inc. (Complete Steel)
Morris Machine Works

Dredging Sleeves
B. F. Goodrich Co.

Drill Bits
Timken Roller Bearing Co.

Drill Sharpening Service
A. Courchesne, Inc.
Gardner-Denver Co.

Drill Steel
Cleveland Rock Drill Co.

Drilling Accessories
Cleveland Rock Drill Co.

Drills
Bucyrus-Erie Co.
Timken Roller Bearing Co.

Drills (Diamond Core)
Chicago Pneumatic Tool Co.

Drills, Hammer (See Hammer Drills)

Drills (Rock)
Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
A. Courchesne, Inc.
Gardner-Denver Co.

Drills (Tripod)
Cleveland Rock Drill Co.

Drills (Wagon)
Cleveland Rock Drill Co.

Drives (Short Center)
Allis-Chalmers Mfg. Co.

Dryers
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Bonnot Company
Combustion Engineering Corp.
Hardinge Company, Inc.
Traylor Engr. & Mfg. Co.

Dumptors
Koehring Co.

Dust Collecting Systems
Allis-Chalmers Mfg. Co.
C. O. Bartlett & Snow Co.

Dust Conveying Systems
Fuller Company

Dynamite
Atlas Powder Co.

Electric Mine Hoists
Nordberg Mfg. Co.

Electric Power Equipment
Allis-Chalmers Mfg. Co.
General Electric Co.

Elevator Belting (See Belting)

Emery Mills
Sturtevant Mill Co.

Engineers
Bonnot Company
Fuller Co.
Hetherington & Berner, Inc.
Productive Equipment Corp.
F. L. Smidth & Co.
Sturtevant Mill Co.

Engines (Diesel)
Chicago Pneumatic Tool Co.
Nordberg Mfg. Co.

Engines (Steam)
Morris Machine Works

Excavating Machinery (See Shovels, Cranes, Buckets, etc.)

Excavators (Crawling Tractor)
Koehring Co.

Excavators (Dragline)
Koehring Co.

Explosives
Atlas Powder Co.

Fans
General Electric Co.

Feeders
Babcock & Wilcox Co. (Pulverized Coal)
Fuller Co. (Cement and Pulverized Material)
Hardinge Company, Inc. (Weighing)
Smith Engineering Works (Plate)

First Aid Supplies
Davis Emergency Equip. Co.

Forges (Oil)
Gardner-Denver Co.

Forgings
Manganese Steel Forge Co., Inc. (Steel)

Furnaces
Combustion Engineering Corp.

Fuses (Detonating and Safety)
Ensign-Bickford Co.

Fuses (Electrical)
General Electric Co.

Galvanized Wire Strand
Macwhyte Company

Gaskets
B. F. Goodrich Co.
Hewitt Rubber Corp.

Gasoline
Texas Company

Gears and Pinions
General Electric Co.
Link-Belt Co.

Gelatin and Semi-Gelatin (See Explosives)

Goggles
Davis Emergency Equip. Co.

Grapples
Owen Bucket Co.

Grease
Gulf Refining Co.
Texas Company

Grinding Balls
Babcock & Wilcox Co.

Grizzlies
American Manganese Steel Co.
Productive Equipment Corp.
Smith Engineering Works
Traylor Engr. & Mfg. Co.

Grizzly Feeders
Traylor Engr. & Mfg. Co.

Hammer Drills
Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
Gardner-Denver Co.

Hammer Mills (See Crushers)

Hoists
Chicago Pneumatic Tool Co.
Curtis Pneumatic Machy. Co.
Gardner-Denver Co.
Link-Belt Co.
Northwest Engineering Co.

Hooks (Wire Rope)
Macwhyte Company

Hose (Water, Steam, Air Drill, Pneumatic, Sand Suction and Discharge)
Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
B. F. Goodrich Co.
Hewitt Rubber Corp.

Hose Couplings (See Couplings—Hose, Pipe, etc.)

I-Beam Trolleys
Curtis Pneumatic Machy. Co.

Insulation (Electric)
General Electric Co.

Kilns and Coolers (Rotary)
Allis-Chalmers Mfg. Co.
Bonnot Company
F. L. Smidth & Co.
Traylor Engr. & Mfg. Co.

Kominuters (See Mills)

Laboratory Crushers
Sturtevant Mill Co.

Lamp Guards
Flexible Steel Lacing Co.

Lighters, Hot Wire (For Safety Fuse)
Ensign-Bickford Co.

Lime Handling Equipment
Fuller Company
Link-Belt Co.
Raymond Bros. Impact Pulv. Co.

Lime Kilns (See Kilns and Coolers, Rotary)

Linings (Iron for Ball and Tube Mills) (See Mill Liners)

Linings (Rubber for Chutes, Ball and Tube Mills, Tank and Pipe)
B. F. Goodrich Co.

Loaders and Unloaders
Bucyrus-Erie Co.
Fuller Company
Geo. Haiss Mfg. Co., Inc.
Link-Belt Co.
Northwest Engineering Co.
Universal Road Machy. Co.

Locomotive Cranes (See Cranes, Crawler and Locomotive)

Locomotives (Geared)
Lima Locomotive Works, Inc.

Locomotives (Steam, Gas and Electric)
General Electric Co.
Lima Locomotive Works, Inc.

Locomotives (Storage Battery)
General Electric Co.

Log Washer
McLanahan & Stone Corp.
Smith Engineering Works

Lubricants
Broderick & Bascom Rope Co. (Wire Rope)
Gulf Refining Co.
Macwhyte Co. (Wire Rope)
Texas Company

Machinery Guards
Harrington & King Perf. Co.

Machinery Repairs
Cement Mill Equipment Co.

Magnetic Pulleys
Birdsboro Steel Foundry & Mach. Co.
C. G. Buchanan Co., Inc.

Magnetic Separators
Stearns Magnetic Mfg. Co.

Magnets
General Electric Co.

Malleable Iron Castings
Cement Mill Equipment Co.

Manganese Steel (Plates and Sheets)
Manganese Steel Forge Co., Inc.

Manganese Steel Castings
American Manganese Steel Co.
The Frog, Switch & Mfg. Co.

Manganese Steel Parts
American Manganese Steel Co.

Mechanical Rubber Goods
B. F. Goodrich Co.

Mill Liners and Linings (Iron for Ball and Tube Mills)
Babcock & Wilcox Co.
F. L. Smidth & Co.

Mills, Grinding (Ball, Tube, etc.) (See also Crushers, Hammer)
Allis-Chalmers Mfg. Co.
Bonnot Company
Bradley Pulverizer Co.
Gruendler Crusher & Pulv. Co.
Hardinge Co., Inc.
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Mine Car Hitchings
Macwhyte Company

Mixers (Commercial Concrete)
Jaeger Machine Co.

Mixers (Concrete)
Gruendler Crusher & Pulv. Co.
Koehring Co.

Motors and Generators (Electric Units)
Allis-Chalmers Mfg. Co.
General Electric Co.

Oil Burners
Babcock & Wilcox Co.
F. L. Smidth & Co.

Oils (Lubricating)
Gulf Refining Co.
Texas Company

Overhead Traveling Cranes
Curtis Pneumatic Machy. Co.

Packings (Pump, Valve, etc.)
B. F. Goodrich Co.
Hewitt Rubber Corp.

WE FIX FLATS

A typical example of Goodrich improvement in rubber

CONVEYOR belt users who have watched their belts go to pieces have wished that damaged belts could be fixed as easily as flat tires can be vulcanized. But to repair a belt requires a press capable of enormous pressure under heat, to vulcanize the patch, and a belt press weighs 30 tons. So a gouge or tear in a conveyor belt has been left to spread until the belt breaks and has to be thrown away, long before normal use wears it out. Time lost, good belting thrown away.

A Goodrich engineer developed an effective repair patch which could be used anywhere but—how to vulcanize it in the field? Experiments began, and at last a miniature press was perfected that does everything the 30-ton press does, yet can be carried by two men.

Now, the moment a conveyor belt is gouged or torn, the hole can be repaired by the Goodrich patch, vulcanized by this "traveling belt factory," and made as good as before the accident.

In one plant this Goodrich development saved $422 in the case of one belt alone, in addition to reducing expensive shut-downs. In *every* plant there are *many* ways to save by use of Goodrich developments, because Goodrich research is constantly at work to make every Goodrich product —belting, hose, packing and thousands of others, a better buy for industry. The B. F. Goodrich Co., Mechanical Rubber Goods Division, Akron, Ohio.

Goodrich

ALL *products problems* IN RUBBER

Classified Directory—*Continued*

Paint (Asphalt)
Texas Company

Pavers (Concrete)
Koehring Co.

Perforated Metal
Chicago Perforating Co.
Cross Engineering Co.
Harrington & King Perf. Co.
Hendrick Mfg. Co.
Wickwire Spencer Steel Co.

Pipe Molds (Concrete)
Universal Concrete Pipe Co.

Plates (Double Corrugated)
Hendrick Mfg. Co.

Pneumatic Drills (See Drills)

Portable Conveyors
Fuller Company
Geo. Haiss Mfg. Co., Inc.
Link-Belt Co.

Portable Crushing and Screening Unit
Smith Engineering Works
Williams Patent Crusher & Pulv. Co.

Powder (Blasting)
Atlas Powder Co.

Power Transmission Machinery
SKF Industries, Inc.

Pulleys, Magnetic (See Magnetic Pulleys)

Pulverators
Allis-Chalmers Mfg. Co.

Pulverizers (See also Crushers, Mills, etc.)
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Bonnot Company
Bradley Pulverizer Co.
Dixie Machy. Mfg. Co.
Gruendler Crusher & Pulv. Co.
Pennsylvania Crusher Co.
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.
Sturtevant Mill Co.
Universal Road Machy. Co.
Williams Patent Crusher & Pulv. Co.

Pulverizer Parts
American Manganese Steel Co.

Pumps (Air Lift)
Fuller Company

Pumps (Cement)
Fuller Company

Pumps (Cement Slurry)
American Manganese Steel Co.
Morris Machine Works
F. L. Smidth & Co.
A. R. Wilfley & Sons

Pumps (Centrifugal)
Allen Cone & Machy. Corp.
Allis-Chalmers Mfg. Co.
Hetherington & Berner, Inc.
Kansas City Hay Press Co.
Morris Machine Works
A. R. Wilfley & Sons

Pumps (Dredging)
American Manganese Steel Co.
Bucyrus-Erie Co.
Morris Machine Works

Pumps (Pulverized Coal)
Babcock & Wilcox Co.

Pumps (Sand and Gravel)
Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Hetherington & Berner, Inc.
Kansas City Hay Press Co.
Morris Machine Works
A. R. Wilfley & Sons

Quarry Cars
Easton Car & Const. Co.

Railways (Electric)
General Electric Co.

Railway Equipment
General Electric Co.

Reinforcement Fabric (Concrete)
Wickwire Spencer Steel Co.

Repair Shop Service
Cement Mill Equipment Co.

Respirators
Davis Emergency Equip. Co.

Road Machinery
Koehring Co.
Northwest Engineering Co.

Rock Bits (See Drill Bits)

Rock Drills (See Drills, Rock)

Rock Wool Machinery
Whiting Corp.

Rod Mills
Traylor Engr. & Mfg. Co.

Rods (Wire)
Wickwire Spencer Steel Co.

Roller Bearings
SKF Industries, Inc.
Timken Roller Bearing Co.

Roofing (Ready to Lay)
Texas Company

Roofing and Siding (Steel)
Joseph T. Ryerson & Son, Inc.

Rope, Wire (See Wire Rope)

Rubber Covered Screens
B. F. Goodrich Co.

Safety Equipment
Davis Emergency Equip. Co.

Sand Drag
Smith Engineering Works

Sand and Gravel Handling Equipt.
Sprout, Waldron & Co., Inc.

Sand and Gravel Screening & Washing Equipt.
Universal Road Machy. Co.

Sand Settling Tanks
Allen Cone & Machy. Corp.
Link-Belt Co.
Smith Engineering Works

Scrapers (Power Drag)
Link-Belt Co.
Northwest Engineering Co.
Sauerman Bros., Inc.

Screens
Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Earle C. Bacon, Inc.
C. O. Bartlett & Snow Co.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
Cross Engineering Co.
Harrington & King Perf. Co.
Hendrick Mfg. Co.
Link-Belt Co.
National Wire Cloth Co.
Nordberg Mfg. Co.
Smith Engineering Works
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Universal Road Machy. Co.
Universal Vibrating Screen Co.

Screens, Scalping (Hercules and Standard)
Smith Engineering Works

Screens (Vibrating)
Allen Cone & Machy. Corp.
Link-Belt Co.
Nordberg Mfg. Co.
Robins Conveying Belt Co.
Smith Engineering Works
Sturtevant Mill Co.
W. S. Tyler Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Screens, Washing (Hercules, Ajax and Standard)
Smith Engineering Works

Screens (Woven Wire)
Wickwire Spencer Steel Co.

Screw Conveyors
Cement Mill Equipment Co.

Screw Rewasher (Single and Twin)
Smith Engineering Works

Scrubbers, Washers
Allis-Chalmers Mfg. Co.
Hardinge Company, Inc.
Smith Engineering Works

Seal Rings
Traylor Engr. & Mfg. Co.

Separators (Magnetic)
Birdsboro Steel Foundry & Mach. Co.
C. G. Buchanan Co., Inc.
Stearns Magnetic Mfg. Co.

Separators (Slurry)
F. L. Smidth & Co.

Shovels, Power (Steam, Gas, Electric, Diesel, Oil)
Bucyrus-Erie Co.
Koehring Co.
Link-Belt Co.
Northwest Engineering Co.

Silos
F. L. Smidth & Co.

Skip Hoists and Skips
Link-Belt Co.

Slings (Wire Rope)
American Cable Co., Inc.
A. Leschen & Sons Rope Co.
Macwhyte Company
Williamsport Wire Rope Co.

Sockets (Wire Rope)
Macwhyte Company

Speed Reducers
Cement Mill Equipment Co.
Link-Belt Co.
Traylor Engr. & Mfg. Co.

Springs (Extension, Compression, Torsion or Flat)
Wickwire Spencer Steel Co.

Steam Shovel Repair Parts
American Manganese Steel Co.

Steel Bars
Timken Roller Bearing Co.

Steel (Bars, Shapes, Plates, etc.)
Joseph T. Ryerson & Son, Inc.

Steel (Electric Furnace)
Timken Roller Bearing Co.

Steel (Open Hearth)
Timken Roller Bearing Co.

Steel (Special Alloy)
Timken Roller Bearing Co.

Steel (Special Analysis)
Timken Roller Bearing Co.

Steel (Structural)
Cement Mill Equipment Co.

Steels, Drill (See Drill Steel)

Stokers
Babcock & Wilcox Co.
Combustion Engineering Corp.

Tanks
Allen Cone & Machy. Corp.
Combustion Engineering Corp.
Link-Belt Co.

Thimbles
Macwhyte Company

Tires and Tubes
B. F. Goodrich Co.

Torches
Cement Mill Equipment Co.

Track Equipment
Nordberg Mfg. Co.

Track Shifters
Nordberg Mfg. Co.

Tractors
Kansas City Hay Press Co.
Koehring Co.

Tramways (Aerial Wire Rope)
Broderick & Bascom Rope Co.
A. Leschen & Sons Rope Co.
Macwhyte Company
Williamsport Wire Rope Co.

Transmission Belting (See Belting)

Transmission Machinery
Allis-Chalmers Mfg. Co.
Timken Roller Bearing Co.

Truck Bodies (Dump)
Easton Car & Construction Co.

Truck Bodies (Ready Mixed Concrete)
Jaeger Machine Co.

Trucks (Mixers)
Jaeger Machine Co.

Trucks and Trailers (See Motor Trucks)

Tube Mills (See Mills, Ball, Tube, etc.)

Tube Mill Liners (See Mill Liners)

Tubing (Blasting)
B. F. Goodrich Co.

Tubing (Seamless Steel)
Timken Roller Bearing Co.

Turnbuckles
Macwhyte Company

Underground Shovels
Nordberg Mfg. Co.

Valves (Air)
Cleveland Rock Drill Co.

Valves (Pump)
B. F. Goodrich Co.

Vibrating Screens (See Screens, Vibrating)

Washers (Sand, Gravel and Stone)
Allen Cone & Machy. Corp.
Allis-Chalmers Mfg. Co.
Eagle Iron Works
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
Traylor Engr. & Mfg. Co.
Universal Road Machy. Co.

Waste Heat Boilers
Combustion Engineering Corp.

Weigh-Mix
Koehring Co.

Welding and Cutting Apparatus
General Electric Co.

Welding Electrodes (Nickel Manganese Steel)
Stulz-Sickles Co.

Welding Rod
Joseph T. Ryerson & Son, Inc.

Wire (Flat, Round, Square or Special Shapes)
Wickwire Spencer Steel Co.

Wire (Piano and Music)
Wickwire Spencer Steel Co.

Wire Cloth
Cleveland Wire Cloth & Mfg. Co.
National Wire Cloth Co.
W. S. Tyler Co.
Wickwire Spencer Steel Co.

Wire Rope
American Cable Co., Inc.
Broderick & Bascom Rope Co.
A. Leschen & Sons Rope Co.
Macwhyte Company
Wickwire Spencer Steel Co.
Williamsport Wire Rope Co.

Wire Rope (Monel Metal)
Macwhyte Company

Wire Rope (Non-Corrosive)
Macwhyte Company

Wire Rope Fittings
American Cable Co., Inc.
Broderick & Bascom Rope Co.
A. Leschen & Sons Rope Co.
Macwhyte Company
Williamsport Wire Rope Co.

Wire Rope Slings (See Slings, Wire Rope)

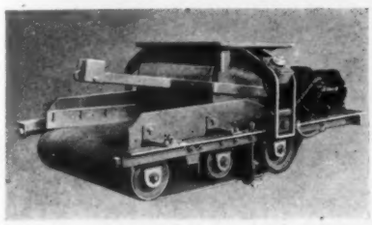
Wire Rope Sockets (See Sockets, Wire Rope)

HARDINGE FEEDERS

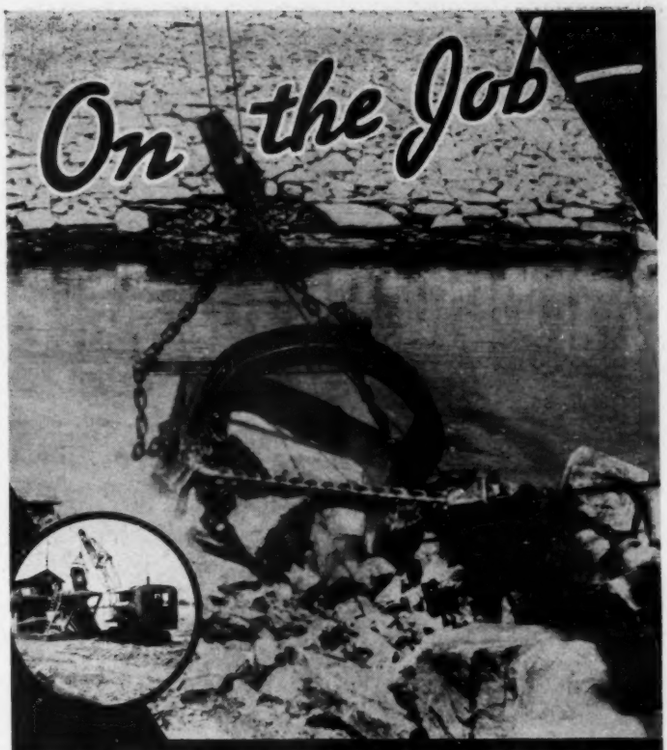
Increase Mill Capacity

Scores of users of the Hardinge Constant Weight Feeder will testify to this:—

We sell Volumetric Feeders at a lower price, but when the purchaser investigates he almost always selects the Constant Weight type. There must be—and is a reason! Write for Bulletin 33C.



HARDINGE COMPANY
INCORPORATED
YORK, PENNA.—Main Office & Works
NEW YORK—122 E. 42nd St. CHICAGO—205 W. Wacker Drive



PAGE AUTOMATICS

Prove they can Increase Yardage 20% to 50%

Users Report Their Results with the Patented Rounded Front AUTOMATIC:

***An Indiana contractor reports:**
"Has increased our production at least 75%. To us, the Page Automatic is the only bucket for dragline work."

***An Illinois coal stripper writes:**
"Last winter we purchased an 8-cy. Automatic. It has increased our yardage, enabled us to dig harder burden that we could not dig before."

***A gravel plant owner says:**
"This bucket has speeded up our operation. It comes up with a full load when working under 15' of water."

* From letters in our files.

Hundreds of AUTOMATIC users in every state and five foreign countries are increasing dragline yardage and profits. Ask them of their results—then see your equipment dealer or write us direct for information on an AUTOMATIC best suited to your machine and job. Bulletin "The AUTOMATIC" gladly sent on request.

"DIG WITH A PAGE AUTOMATIC"

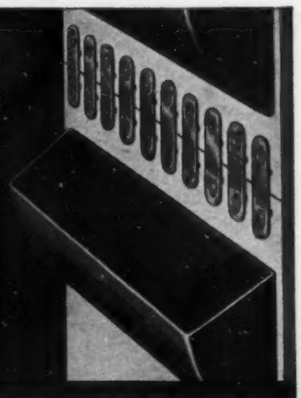
Address: Dept. K

BUILT IN SIZES 3/8 to 15 CUBIC YARDS

PAGE ENGINEERING COMPANY
CLEARING POST OFFICE CHICAGO, ILLINOIS

FLEXCO HD

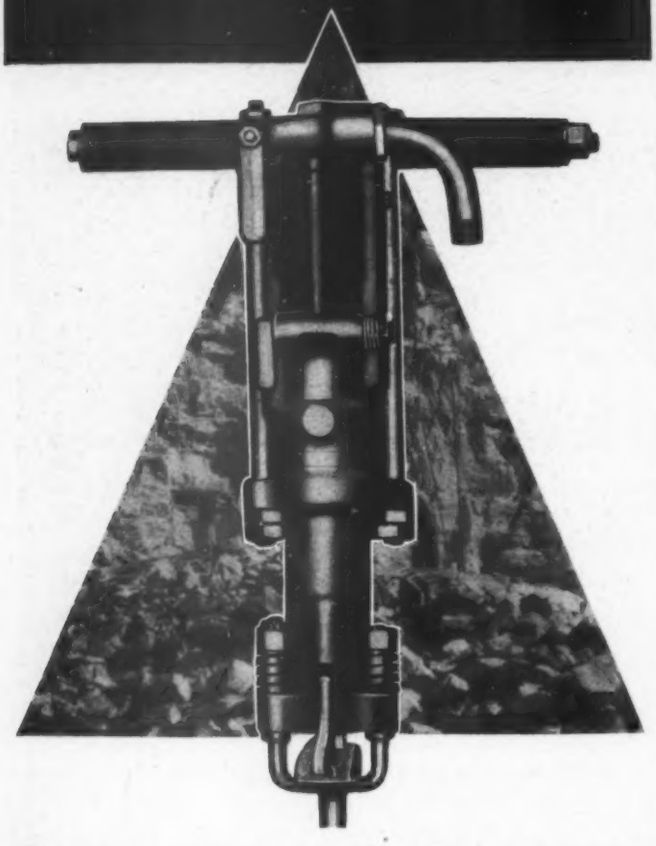
BELT FASTENERS *for* ELEVATORS *and* CONVEYORS



COMPRESSION develops the tremendous strength of the FLEXCO HD joint. The recessed plates and teeth embed in the belt, producing a smooth, powerful, tight butt joint of balanced pull. Plies cannot work against each other and separate in belt ends. Remarkable service records are developed by these fasteners and thousands of plants use nothing else. Made of steel or Monel Metal. Templates, wrenches and punches supplied to facilitate application. Sold by jobbers and belting houses in five sizes. Consulting service given gladly regarding any belt joining.

FLEXIBLE STEEL LACING COMPANY
4671 Lexington Street, Chicago
In England at 135 Finsbury Pavement, London, E. C. 2

ECONOMICALLY RIGHT For Quarry Work



MORE FOOTAGE PER SHIFT —EVERY SHIFT

Whether you use sinkers for your primary or secondary drilling the drilling speed of the Gardner-Denver S-55 assures maximum footage . . . its easy riding prevents drill runner fatigue . . . its reliability eliminates expensive delays. The S-55 is economically RIGHT for quarry work — which accounts for its popularity today.

- Maximum drilling capacity for its weight
- Easiest riding for its power
- Reliable always, built to "take it" by an experienced organization which knows what a drill must take

SINCE 1859

GOOD Design. Materials. Workmanship. Value.

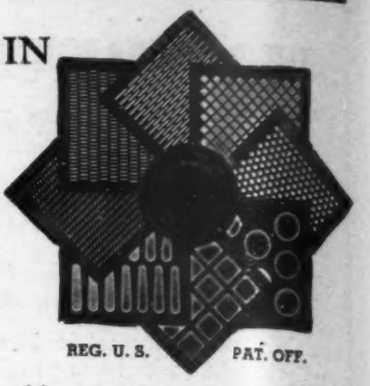
GARDNER-DENVER COMPANY, 102 Williamson St., Quincy, Ill.

GARDNER-DENVER

EVERYTHING IN PERFORATED PLATE . . .

FROM

Hendrick



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And when we say everything, we mean "everything" . . . all the commercial perforations: round, square, hexagon, slotted, and the special, "Squaround."

These perforations and others, are available in plain, flat, corrugated or curved, and may be had in any metal you specify, as well as in Hendrick high-carbon, heat-treated plate, or abrasive-resisting steel.

Hendrick is logically . . . "Headquarters" for perforated plate.

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PLEASE CONSULT TELEPHONE DIRECTORY

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DUST COLLECTORS

•Investigate the savings that this efficient dust collector can make in your plant. No moving parts—no manual supervision—no replacement of filtering units — no wear — no fire hazard. Highly efficient. Descriptive literature sent on request. The C. O. Bartlett & Snow Company, 6194 Harvard Avenue, Cleveland, Ohio. Representatives in the principal cities.

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---Built for Quarry Service!

THERE'S no question about the adaptability of Shay Geared Locomotives to quarry service. They are built for it.

Shay Geared Locomotives are rugged. This fits them to withstand abuse and to give continuous, dependable operation under the most severe conditions.

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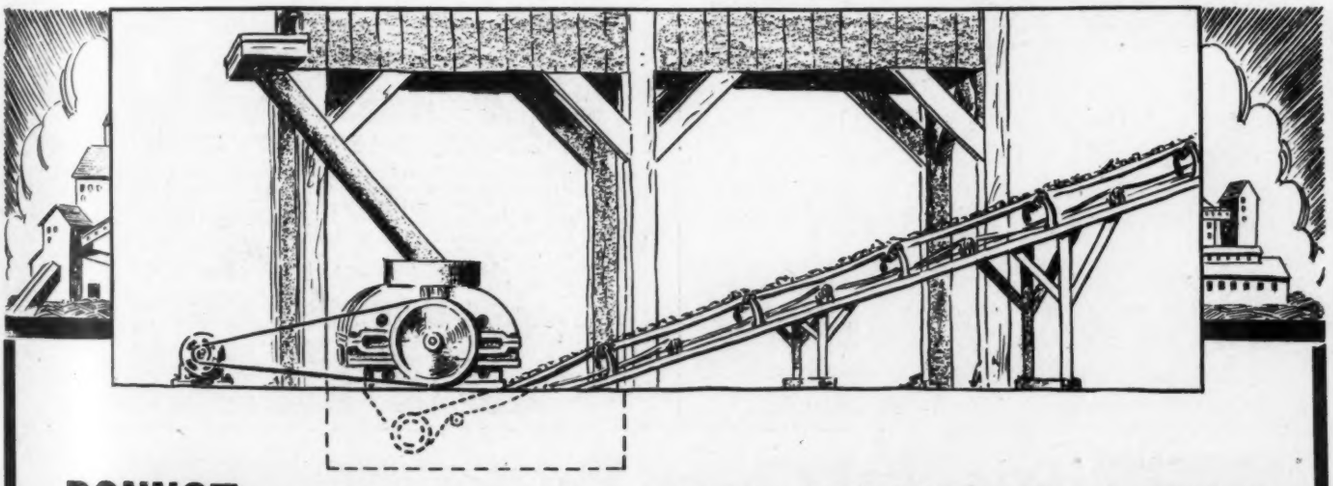
LIMA LOCOMOTIVE WORKS, Incorporated
LIMA, OHIO
Sales Office: 60 E. 42nd St., New York, N. Y.



BONNOT *Reduction Crushers Perform in Texas . . . . . .*

—and perform well, too! BONNOT crushers were installed in June, 1935, because of the obvious advantages they held over competitive crushers they replaced.

On the competitive crusher the manganese jaw life was 1½ sets per month. The BONNOT Crushers have been on the job now more than a year and the present manganese consumption to date is only ONE SET!!

Former horsepower 40—present horsepower 8.8. Where previously the capacity was 15 tons per hour, the present capacity is up to 34 tons per hour of 1" material in this gravel plant.

These are certainly substantial savings and represent only some of the many advantages obtained through the installation of BONNOT Crushers—the crushers with Manganese wearing parts—Reversible concaves—Cast steel frame—Bronze steel bearings—Renewable liners—Extra large shaft—Positive pressure lubrication—Cast iron safety plates, etc.

Write for Bulletin No. 150

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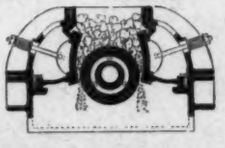
CANTON, OHIO
• *SINCE 1891* •
NEW YORK OFFICE
30 CHURCH STREET



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Consult

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Easton, Pa.

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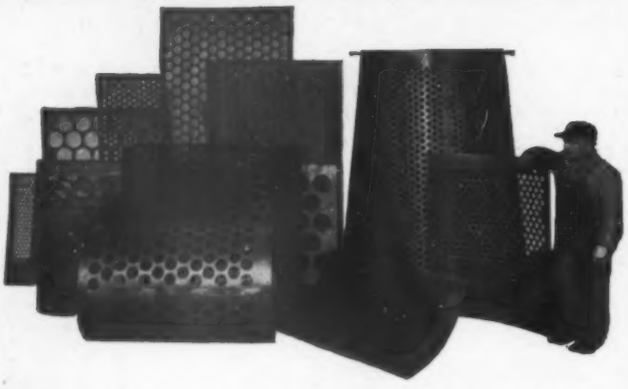

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SPEED!

That's what the DEMPSTER DUMPSTER was designed for.

Spot detachable buckets at convenient loading points—pick them up and haul to point of dumping. Buckets easily picked up, dumped and replaced. Here you have a sure method of increasing profits. Send for all the facts.

The DEMPSTER DUMPSTER is truly a revelation in speed, convenience and profit.

DEMPSTER BROS., Inc.

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When steel is needed in a hurry you can depend upon Ryerson for quick action. Complete stocks of all kinds of steel products, including Ryerson Abrasion Resisting Sheets and Plates, bars, structurals, bolts and nuts, rivets, boiler fittings, chain, etc. Order from the nearest plant. Joseph T. Ryerson & Son, Inc., Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

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Special Owen Buckets *too!*

Owen's record in designing and building successful buckets for uncommon service is the natural result of long specialized experience and the availability of exclusive patented features of fundamental importance.

Consult us regarding your needs for regular or special buckets and grapples.

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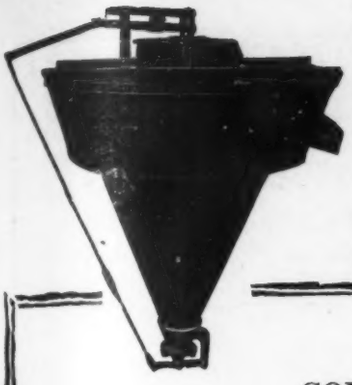
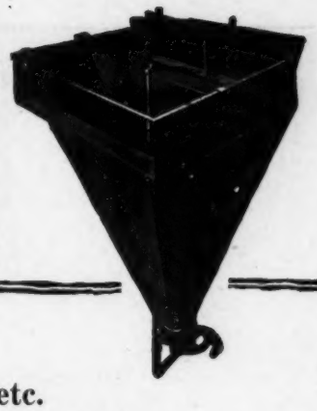
Branches: NEW YORK • PHILADELPHIA • CHICAGO • BERKELEY, CAL.



ALLEN
CONES *and* TANKS



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Frequently two or more products can be made from sand that is now being sold as a single product. ALLEN TANKS are extensively used for recovering commercially fine sands previously wasted.

From a small representative sample from your deposit, our engineers can determine the various grades and quantities obtainable.

ALLEN CONES and TANKS give a continuously uniform, accurately-classified, thoroughly clean and dewatered product. Constant attention is unnecessary; they work automatically. This freedom from attention often means a saving greater than their original cost in a single season. Let us assist you in solving your classifying problems.

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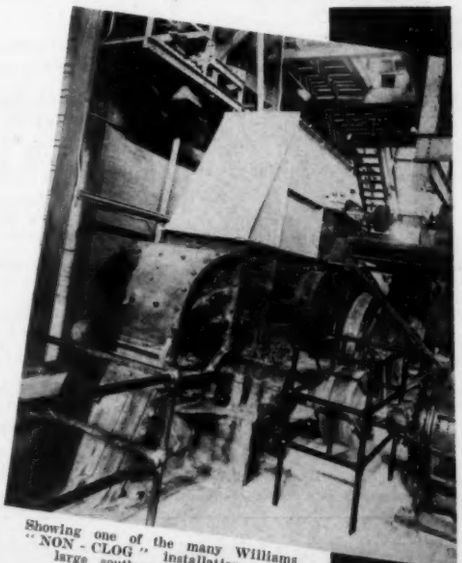
A MORE SIMPLE NON-CLOG CRUSHER...

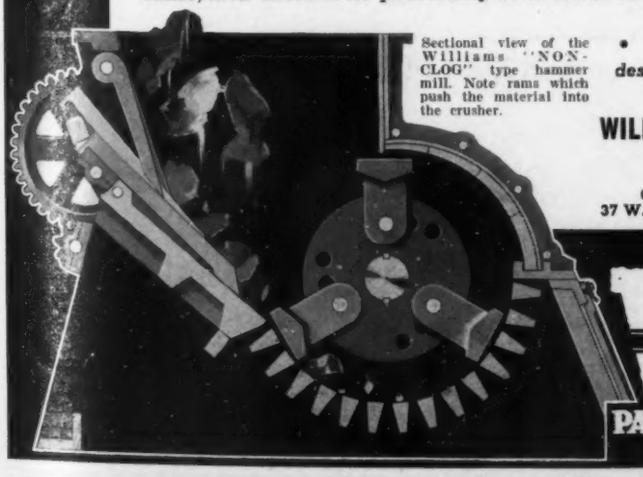
Less complicated with fewer parts to get out of order and an ability to crush finer—¾" if desired—are the outstanding advantages of the Williams Pusher type NON-CLOG Crusher.

It handles wet rock and rock containing clay and shale overburden, taking the material as wet as it can be handled by a shovel and reduces it to ¾", 1" or 1½", depending upon adjustment.

The two pushing rams comprise the entire NON-CLOG equipment. Mounted on an eccentric driven from the main crusher shaft, these rams slide up and down over the breaker plate, keeping it clean and pushing the material into the path of the crushing hammers. The breaker plate itself is stationary and the opening between it and the first grate bar is always the same, and there is no possibility of oversize rock passing through.



Showing one of the many Williams "NON-CLOG" installations in a large southern cement plant.



Sectional view of the Williams "NON-CLOG" type hammer mill. Note rams which push the material into the crusher.

• • • *Write for more descriptive bulletins* • • •

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Complete specifications included

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(Specially Heat Treated)

Ingersoll Rand, Timken, Sullivan or Crusca Rods

The most modern equipment is used, including muffle type furnaces controlled by electric pyrometers, assuring correct heats as recommended by drill manufacturers for their particular steels.

A study of drill steel and drill bits has made it possible for us to specialize in this work.

A. COURCHESNE, INC.
Conversion Shop — Drill Steel & Steel Processing
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where SPROUT-WALDRON Wing Pulleys are used. The same is true of your Elevator belts.

Material conveyed cannot lodge between belt and pulley to cut your belts.

Interchangeable with standard pulleys.

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Elevating, Conveying and Transmission Equipment

ACTIONS SPEAK LOUDER THAN WORDS
Learn for yourself that ROL-MAN SCREENS of Rolled, True Manganese Steel actually do last many times longer than what you are using (if it is not Rol-Man). We positively guarantee the lowest cost per screened ton. Write us for the names of users in your vicinity.
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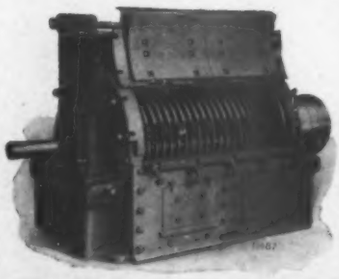

will give you dependable day-in and day-out service reducing limestone—shale—slate—clay—chalk—marl—gypsum—phosphate rock—asbestos rock—and many other products.

Catalog No. 550-H

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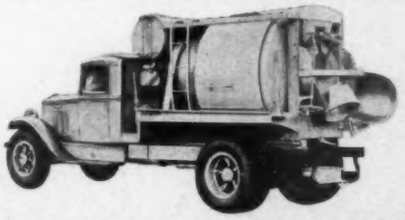

Rex Moto-Mixers are the key to lower-cost methods of delivering Ready-Mixed Concrete to the job.

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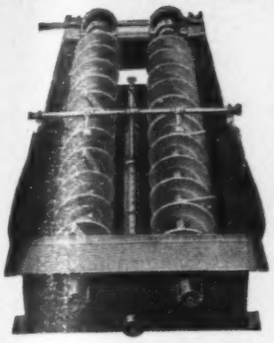

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Ehrsam Crushers

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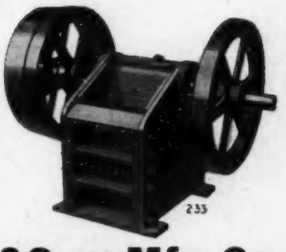

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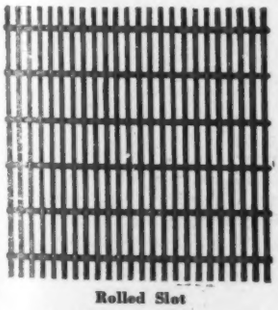

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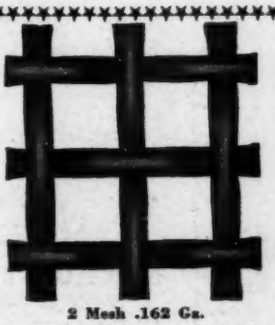

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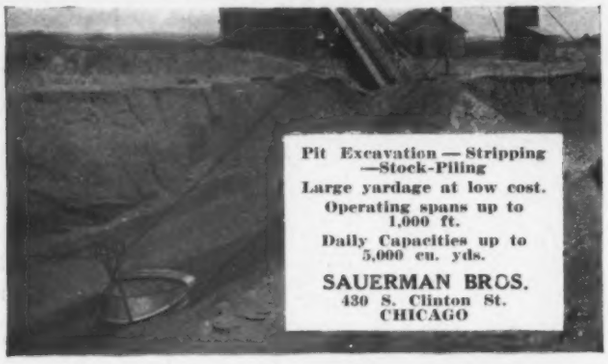

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Daily Capacities up to 5,000 cu. yds.

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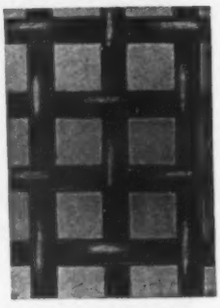

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—FOR—
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Established 1881 Carlisle, Pa.

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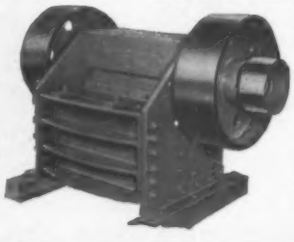
CRUSHERS and PULVERIZERS



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The MODERN **AIR SEPARATOR**

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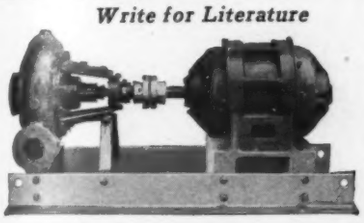

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Long Sweep Ells, Hand Hole and Plain. Flop Valves, etc.

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"FLEX-SET" PREFORMED YELLOW STRAND

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SCRUBBER

This scrubber will do the good work.

State Capacity Required!

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Mfrs. of Sand Crushing, Grinding, Washing and Drying Machinery

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are self-framing and more easily installed. Blinding reduced to minimum. Accurate separation assured. Your requirements anticipated and a very complete stock enables us to make prompt deliveries.

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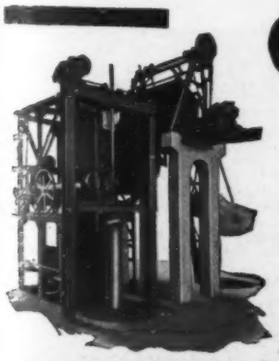

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PIPE MOLDS
(New and Used)

All equipment necessary for the pipe manufacturer

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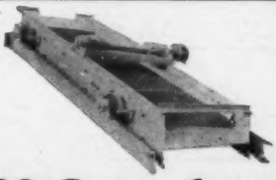

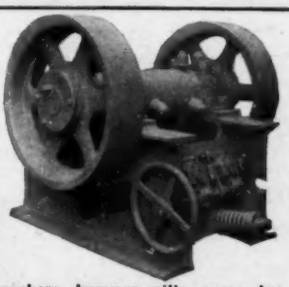

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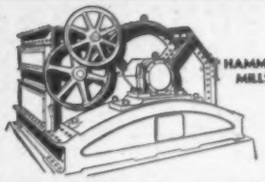

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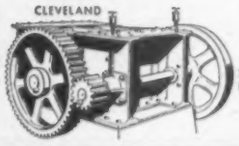

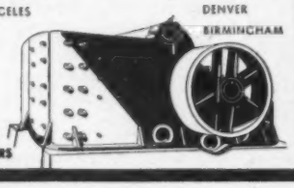

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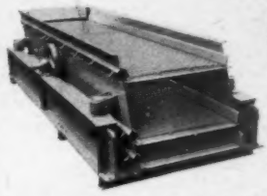

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NON-CLOG
HAMMER MILLS

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STEAM ENGINES

For abrasive mixtures, corrosive liquids, or clear water. Any capacity, head, or method of drive.

For sand and gravel production, water supply reservoirs, filling in, or waterways improvements.

Vertical reciprocating type, single and double cylinders, compound and triple expansion, 3 to 1000 hp.

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PATENTED
for Slurry
for Sand Tailings

ELIMINATION of stuffing box has done away with many troubles common to centrifugal pumps.

Pump maintains extraordinary efficiency.

Pumping parts unusually heavy, insuring long life. Cleaning out pump or changing wearing parts requires only a few minutes.

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You invest in results only. No dazzling contraptions to add to expense and worry. Just install the UNIVERSAL Late Model Super-Vibrator and watch production go up—quality rise and operating costs drop. And the UNIVERSAL costs less to begin with. These are only some of the reasons why such a high percentage of UNIVERSAL Vibrator users reorder. They like the saving these vibrators effect.

It's the real producer of better results at lower cost.

If interested—write.

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HERE IS A REAL SCREENING DATA BOOK FREE . . . 36 PAGES OF CHARTS, TESTS, SELECTIVE THROW, APPLICATIONS

YES send me your new BOOK "data on Controlled Vibration and Screen Efficiency."

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11 to 13½% Nickel Manganese Steel
U. S. Patents 1,876,738, 1,947,167 and 2,021,945.

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for Reclaiming 11 to 14% Manganese Steel Parts
Get them from your regular jobber.

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GOOD USED EQUIPMENT

1—6x40 Bonnot direct heat Rotary Dryer, ⅛" shell, feed and discharge end spring seals. Also 70"x40'.
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6—Ruggles-Coles Rotary Dryers — 8x60' F-15; Class A double shell, 5x26', 6x35', 80"x45'.
2—3'x17'6", 4x35', 5x30' indirect heat Rotary Dryers.
7—Rotary Kilns, Bonnot Co., 6x40', 6x60', 8x100'.
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3—P.&M. 8'6" and 9'6"x150' Rotary Kilns.

1—24"x24" Jeffrey single roll Crusher.
1—18"x36" McLanahan-Stone Single Roll Crusher, Texrope drive, 25 HP. 3/60/440 volt motor.
1—7"x24" Sturtevant Jaw Crusher, to ¼".
1—40"x42" Bacon-Farrel Jaw Crusher.
1—36"x36" No. 4XC Gruendler Hammer Mill, ball bearings. Also all other sizes.
2—6'x12' Hardinge Iron Lined Rod Mills.
1—4'x8' Kennedy Iron Lined Ball-Tube Mill.
1—3'x12' Hendy Iron Lined Tube Mill.
2—Gayco Air Separators, 10', 30".
10—Tyler Hummer Screens, 3x5 triple deck, No. 31; 2—3'x5', No. 31, single deck; 3—4'x7' No. 60, double deck. Also all other makes of Vibrating Screens.

8—Hardinge iron lined Ball Mills, 3'x8", 4½'x16", 5'x22", 6'x22"; also other sizes.
1—8'x22" Hardinge Iron Lined Ball Mill, with Hardinge Classifier.
1—No. 32 Marcy Ball Mill.
3—Raymond high-side Roller mills, 3-roll, 5-roll; 1—5-roll, low side.
5—Raymond Pulverizers, Nos. 0000, 00, 1.
1—No. 3 Raymond Pulverizer, complete.
1—No. 2 Sturtevant Ring Roll Mill.
4—3'x6' Sturtevant Moto-Vibro Screens, 2-deck.
3—Sturtevant Rotary Fine Crushers, Nos. 0, 1, 1½, 2.
2—36x16, 20x14" Sturtevant Crushing Rolls.
1—Flory single drum Hoist, with 25 H.P. AC motor.

Just a partial list.
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What do you wish to sell? Send us details.
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Plant and Shops at Newark, N. J., cover 8 acres of ground.

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12—5-yd. 36" ga. Western Dump Cars.
6—2-yd. 36" ga. Koppel Steel V Dump Cars.
4—1½-yd. 36" ga. Insley Steel V Dump Cars.
2—3½-ton 36" ga. Whitcomb Gasoline Locomotives.
1—9x10 Sturtevant Vertical Steam Engine.
1—10x10x12 Ingersoll Steam-Driven Air Compressor.
1—9x10 Lidgerwood 3-Drum Steam Hoist.
1—8¼x8 Lidgerwood S.D. Steam Hoist.
23—12-yd. Western std. ga. Air or Hand Dump Cars.
2—40-ton Baldwin S.T. Locomotives, 14x22 cyls.
Rails—First-Class Relay Rails and Bars, 60, 70, 80, 85, 90 and 100 lb. Rails, Tie Plates, etc.

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CRUSHER BARGAINS

2' Symons cone coarse bowl
2' Symons Horizontal Disc
30"x14" DENVER Crushing Rolls
18x24" Llewellyn Jaw Crusher

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STEAM SHOVEL
MARION NO. 70

3¼ Yard, Locomotive Type, on Crawlers.

Condition very good.
PRICE $8000

On account of recent fire we are moving our plant.

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OHIO GRAVEL COMPANY
5225 Eastern Avenue
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FOR SALE

3—Erie B2 1 yd. Steam Shovels.
2—701 Lima Electric Shovels.
2—20-ton 100' Boom Steel Stiffleg Derricks and 100 H.P. 3-drum Electric Hoists.
1—10-ton 80 H.P. 100' Boom Guy Derrick.
3—500 cu. ft. Chicago Pneu. Air Comp.
2—807 ft. Ingersoll-Rand XCB Compressor.
528 ft. Ingersoll-Rand Air Compressor.
1—1000 ft. Chicago Pneu. Diesel Air Comp.
60 H.P. Clyde 2-speed Gas Hoist.
6—4", 6", 8" Centrifugal Pumps.
24"x400' Belt Conveyor.
½ yd., ¾ yd., 1 yd. and 2 yd. Clamshell Buckets.
2—2 yd. Meade-Morrison Clamshell Buckets.
3—Hayward ¾ and 1-yd. Orange Peels.
6—12 and 14-ton 36" ga. Gas Locomotives.
1—43-ton Baldwin Switching Locomotive.
30—Western 4-yd. and 5-yd. Dump Cars.
15—2-yd. V-shape Standard Ga. Dump Cars.
1—4'x12' Telsmith Vibrating Screen.
3—60 H.P. 3 ph. 60 c. 220-440 v. Elec. Motors.
2—Sauerman 1-yd. Elec. Drag Scrapers.
1—Telsmith No. 5 Crusher.
1—6-ton Universal Truck Crane.
1—35-ton Gooseneck Trailer.

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GANTRY CRANE or ORE BRIDGE

5-ton Dravo—10-ton Without Bucket
130' Span, 60' Overhang one end.
Suitable for
SUPPLY YARD
STORAGE YARD
DOCK CRANE
MATERIAL YARD
BLAST FURNACE

HETZ CONSTRUCTION COMPANY, INC.
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AMERICAN 30-ton 4-wheel saddle tank locomotive, 12x18" cylinders.
VULCAN 33-ton 4-wheel saddle tank locomotive, 13x18" cylinders. (Two duplicates.)
PORTER 36-ton 4-wheel saddle tank locomotives, 14x20" cylinders, (Two duplicates.)
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BIRMINGHAM, ALA.

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676 ft. Worthington Air Compressor.
¾-yd. Erie B Steam Shovel.
8—1-yd. Erie B-2 Steam Shovels.
36x36 Jeffrey B2 Pulverizer.
25-ton Browning Locomotive Crane.
5-ton Whitcomb 24 Ga. Gas Locomotive.
No. 36 American Ring Hammermill.
Lawrence 10", 40 HP Elec. Centr. Pump.
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24"x100' Belt Conveyor.
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Send me full details and prices on equipment checked

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Name .....
Address .....

(Classified Advertising Continued on Next Page)

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9—100	G.E.	KT	1800
3— 50	G.E.	KT	1800
2— 75	WEM	CS	720
1—150	WEM	CS	1750
1—125	WEM	CS	1750
4— 50	G.E.	KT	900
3— 50	G.E.	KT	1200
4— 40	G.E.	KT	680
2— 40	G.E.	KT	600
1— 50	WEM	CS	575
3— 40	WEM	CS	870
3— 40	WEM	CS	1170
2— 30	WEM	CS	1170
2— 40	WEM	CS	1750
1—300	ALLIS		900
1—200	G.E.	1-4	1800
1—100	G.E.	KT	450

220/440 Volts Slip Ring

200	H.P.	WEM	CW	500	
200	H.P.	G.-E.	1-M	435	3 bearing
125	H.P.	G.-E.	1-M	435	3 bearing
150	H.P.	WEM	CW (new)	575	3 bearing
125	H.P.	WEM	CW	575	3 bearing
2— 75	H.P.	WEM	CW	680	
100	H.P.	G.E.	MT	900	
60	H.P.	G.E.	MT	900	
75	H.P.	G.E.		600	
100	H.P.	G.E.		680	
100	Elec.	Dynamic		900	B.Bearing
3— 50	H.P.	G.E.		900	
150	H.P.	G.E.	ITC	680	Hoist
	with full reversing magnetic control				
50	H.P.	G.E.	MTC	900	
2— 40	H.P.	WEM	CW	900	
7— 20	H.P.	G.E.	MTC	900	Unused

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Motor Generator Sets , Hoists , Pumps , Air Compressors , Fans

'Phone, wire or write your inquiries

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Jeffrey No. 3 Lime Crusher-Pulverizer.
Gardner-Denver Portable Compressor, 160'.
I.R. 2-Stage Belted Air Compressor, 446'.
Schramm 15 HP. Electric Compressor, 120'.
Hayward 1-yd. G Clamshell Material Bucket.
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300 Robins 30" Trough Idlers and Pulleys.
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Buffalo Blower, No. 11, 40 HP, AC Motor.

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Jaw Crushers—2"x6" up to 66"x84".
Crushing Rolls—12"x12" up to 54"x24"—Gyratory Crushers—No. 3 up to 42".
Ring Roll Mills — No. 0 and No. 1 — Swing Hammer Mills.
Rotary Fine Crushers—No. 1, No. 1½, No. 2.
Direct Heat Rotary Dryers—4'x30', 5'x30', 5½'x40', 6'x50', 3½'x25', 8'x50'.
Semi-indirect Heat Dryers, 4'x30', 4½'x26', 5'x30' and 8½'x75'.
Cement Kilns—3' up to 9½' diameter.
Hardinge—Marcy & Fuller—Lehigh Mills.
Raymond Mills—No. 00, No. 0, No. 1 & No. 5 roll.
Tube—Rod and Ball Mills—4' to 8' diameter.
New dryers made for all purposes.
One No. 27 I-R oil furnace for drills.

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6" Traylor Crusher with TZ Mantle.
No. 49-S Kennedy B.B. Gearless Crusher with synchronous motor.
Telsmith No. 3 F' Reduction Crusher.
36"x6" & 48"x36" Farrel Jaw Crushers.
No. 4½ (20x10) Champion Crusher.
60 ft. Guy Derrick Handling Outfit with 60 HP Gas Hoist.
1 yd. Sauerman Elec. Slackline Outfit.
1 J&C Lime Hydrator.
Smooth Face Rolls 36x16 & 30x10.
1¼ yd. Marion Electric Cat. Shovel.
Pennsylvania S-7 Hammer Mill.
Williams Jumbo No. 4 Hammer Mill.
6'x55' Rotary Dryer.
Tube Mills: 7'x22', 7'x10', 5½'x20', 5'x22' & 5'x18'.
No. 6 Austin Gyratory Crusher.
30" Griffin Mill.
42" Fuller Lehigh 4 Ball Mill.
¾ yd. Marion Electric Shovel.

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1—35-ton McMyler Locomotive Crane.
1—30-ton Whitcomb Gas Locomotive.
3—12-ton Whitcomb Gas Locomotives.
1—1-yd. Koehring Gas Crane.
1—¾-yd. Osgood Comb. Shovel-Crane.
1—½-yd. Byers Comb. Shovel-Crane.
5—Clamshell Buckets ½ to 1½.
1245 ft. Ingersoll-Rand Compressor.
450 ft. Ingersoll-Rand Compressor.
1—100 HP. Elec. Dragline Hoist, 2-yd. bkt.
5—Jackhammers.
1—Crane attachment for Marion 32 Shovel.
1—4½x6 Swinging Engine.

J. T. WALSH

Brisbane Building Buffalo, New York

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1.—Model 6 Northwest Twin City Engine, 50' boom, long crawlers, 1¾-yd. bucket.

2.—One-yd. Bucyrus-Erie-Waukesha Engine, 40' boom, 1-yd. bucket.

3.—K-44 Link Belt—Waukesha Engine, 60' boom, 1½-yd. bucket.

E. F. MARSH COMPANY
4030 Chouteau Avenue
ST. LOUIS, MO.

FOR SALE

Nelson Bucket Loader on full crawlers. First class condition.
1—Five-ton gasoline-driven **Tandem Roller.**

WANTED

Buildozer for Caterpillar "30."

SEARS & BOWERS
4th & Spring Garden St., Easton, Pa.

SHOVEL AND CRANE BARGAINS

Bucyrus-Erie one-yard Gasoline Shovel, checked by the factory, in good operating condition, at.....$2200
Northwest one-yard late Model 105 with 45' Boom, new style crawlers, steel cab and clamshell bucket, completely overhauled, guaranteed in good condition. $3900

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$6.00 to $72.00

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, , MONTHS TO PAY

SUPERIOR
OXY-ACETYLENE MACHINE CO.
Hamilton, Ohio

ELECTRIC LOCOMOTIVES

JEFFREY—GENERAL ELECTRIC—WESTINGHOUSE — GOODMAN. Shifting and Haulage types, all weights, gauges, 250-500 volts trolley, Straight Battery and Combinations.

WALLACE E. KIRK COMPANY
Incorporated
GRANT BUILDING PITTSBURGH, PA.

Sullivan Angle Compd. Belted Compressor Class WJ3—14x8¾x10 with 100 HP. Synch. Motor 3/60/440.
25 HP. Fairbanks-Morse Oil Engine, Type H.
No. 4 McCully Gyratory Crusher.
No. 5 Gates Gyratory Crusher.
100 HP. Vertical Boiler.

ARTHUR S. PARTRIDGE
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on used belt conveyors—bucket elevators—conveyor idlers and elevator buckets because our prices are lower. Try us and be convinced.

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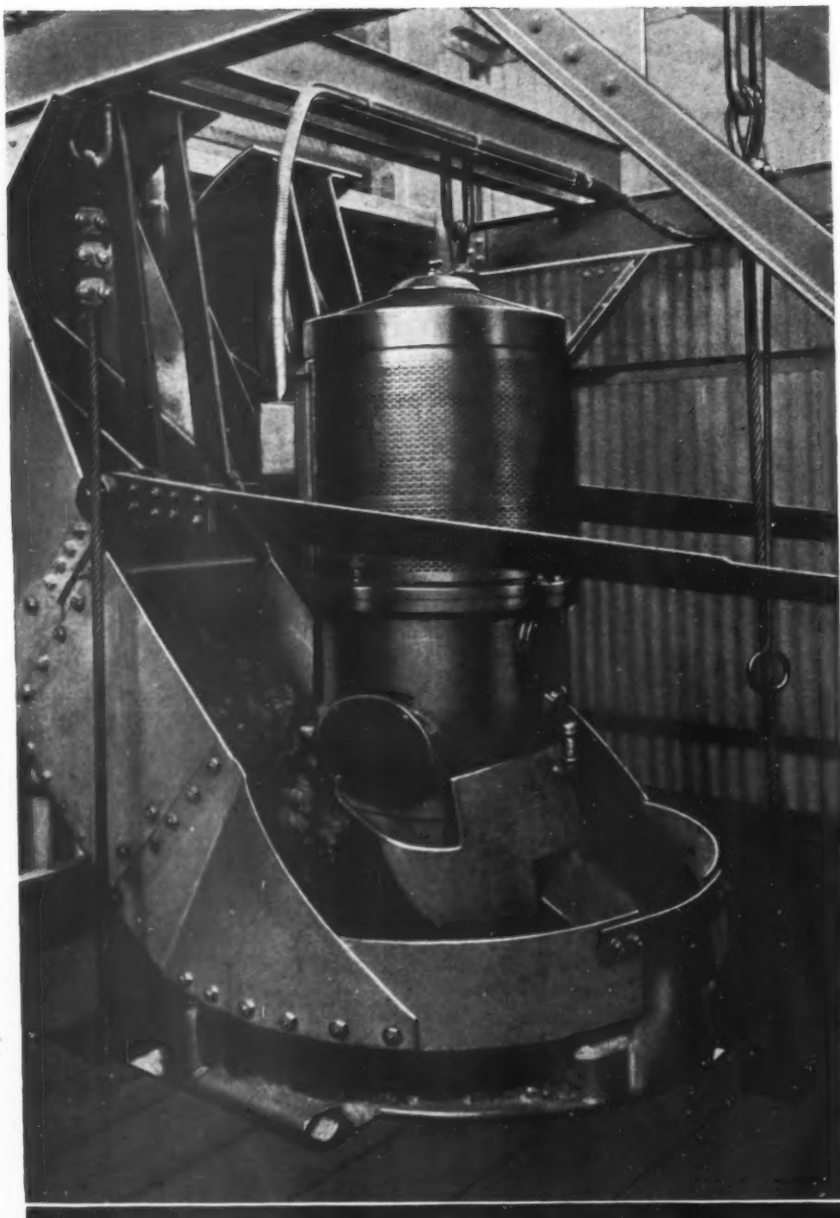

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A test, which was of long duration was made on a 10″ Newhouse Crusher driven by a 125 hp, 495 rpm motor. The setting was 9/16″ on the close side with a ½″ throw eccentric. The maximum power input to the motor was 100 hp.

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